CORROSION—

The Cause—
The Effect—
The Remedy

Corrosion---

The Cause--The Effect--The Remedy

This entire book is embodied
in a treatise entitled

The Civilization of Ferric Sheet Metal

The Stark Rolling Mill Company

Canton, Ohio

We are indebted to the authors of the following works for the assistance derived from their books in writing "The Civilization of Ferric Sheet Metal"— "Metallurgy of Iron and Steel," Bradley Stoughton; "The Corrosion of Iron and Steel," J Newton Friend, and "The Story of Iron and Steel," J Russell Smith, Ph. D.

THE STARK ROLLING MILL CO.

THE "CIVILIZATION" OF FERRIC SHEET METAL

A treatise which embodies the entire topic—
Corrosion—The Cause—The Effect—The Remedy

"FROM DUST THOU ART"

A HANDFUL of clay—man.

A shovelfull of iron ore—a metal sheet.

Clay and Iron Ore are both earthy substances. And the law of nature requires that both man and iron ore products return from whence they came.

"TO DUST RETURNETH"

Man dies. Sheet metal corrodes.

The weaker man succumbs first. And the "weaker" sheet metal disintegrates first.

Let us carry this simile a step further.

Primitive man required civilization—a long and tedious process covering a period of over five thousand years, and which is not even now completed.

The first metal sheet was crude. It needed development, or "civilization."

All men today are made from the same "raw material"—clay, but they do not all possess the same degree of intellect, refinement or civilization.

All ferric sheets are made from the same raw material—iron ore, but they all do not, by any means, possess the same properties, the same degree of development—or "civilization."

The advent of the modern commercial sheet metal is only a matter of a little more than a half century, but the iron industry is as old as the world itself.

IRON

Iron is found and seen everywhere—in the most unsuspected forms.

The complexion of rosy youth (natural or artificial), red paint, red brick and even the rosy apple derive their hue from iron.

It has been estimated that as much as a fifth of the entire content of the globe is iron. Yet man cannot delve further than about five thousand feet—the mere surface of the earth.

If someone could manage to go a few thousand miles beneath the surface of the earth, he would undoubtedly come to gigantic mountains of iron ore.

When, where or how the first iron was found will remain a mystery forever. Its discovery may have been accidental, like that of the great silver mines of Potosi in South America.

We are told that a camp fire melted a lump of silver and revealed one of the richest silver mines in the world.

A lightning bolt, a forest fire or another camp fire may have unfolded iron ore deposits to mankind.

"NOTHING NEW UNDER THE SUN"

In the fifteenth century (B. C.) a forest fire revealed to the natives of Crete that the ores of their island would make iron.

The Bible, histories and ancient literature all contain evidence that iron was made and used thousands of years ago.

The fourth chapter of Genesis tells us that Tubal Cain, born in the seventh generation from Adam was an "instructor of every artificer in brass and iron."

The natives of Canaan fought the Israelites from iron chariots, we are told. The terrible Og, King of Bashan, had an iron bed and the spearhead of Goliath weighed six hundred shekels of iron.

Extensive research discloses the fact that iron was made by the Egyptians, Assyrians, Chaldeans and Babylonians four thousand years ago, and somewhat later by the Greeks, Romans, Spaniards and Vikings.

And though the use of iron was widespread, it was costly and could almost be ranked as a precious metal.

Primitive methods of manufacture was the reason for the costliness of iron.

ONE THOUSAND DOLLARS A TON

Recent experiments in iron making by the old Roman methods showed that iron could not be made in the same way now for less than a thousand dollars a ton.

Perhaps this explains why the small iron clasps which held together the stones in the Roman Coliseum disappeared so mysteriously.

CRUDE METHODS

Crude methods of manufacture, however, did not mean inferior quality of iron. To the contrary, iron of those days was of a wonderfully superior quality.

The primitive forges produced the iron in the form of a lump; not in a molten form like the iron and steel of today. This lump of hot iron was kneaded, hammered and reheated. Then refined in refinery forges until it was pure and homogeneous.

Two men produced about a dozen pounds of malleable iron in a day by this method. Is it any wonder then that it was durable, highly efficient and costly?

EXCELLENT QUALITY

The far famed swords of Toledo, Bilboa and Damascus, which have never been excelled, are excellent specimens of the old time irons' superiority.

William the Conqueror attributed his victory at Hastings in 1066 to the superior swords of his men.

A monument for the durability of the old time irons is the iron pillar at Delhi, India, weighing about seventeen tons, of which we nearly all have heard.

For twenty-eight centuries this pillar has resisted the weather and today it seems hardly affected.

Explorations beneath the great pyramid of Gizeh in 1837 disclosed a small piece of a wrought iron tool, which was used in the construction of that monument about five thousand years ago. It may be seen at the British Museum—more evidence of the durability of the ancient irons.

A LOST ART

Iron making in those days was indeed an art. What caused its decline during the middle ages, we do not know, but this decline was accompanied by a general lapse of knowledge of iron making until it was revived by the Germans during the latter part of the mediaeval period.

Although the industry was revived, the knack of making the same high quality of iron seemed to be lost.

THE FIRST BLAST FURNACE

To the Germans, however, goes the credit for producing the first iron that could be melted to a liquid state. Up to then iron could not be poured. The Germans really produced the first form of the modern blast furnace, which they called the "stuckofen." This "stuckofen," or blast furnace, produced cast iron.

This was the beginning of modern iron making. From now on the manufacture of iron made great strides. Everyone took a hand in improving the blast furnace, including the Belgians, French and English.

The great demand, however, was for a method for producing steel in large quan-

tities cheaply. And finally this want was filled.

TWO MINDS WITH BUT A SINGLE THOUGHT

It has always been a question as to whether the credit for the invention of the "convertor" process of making steel is due to William Kelly or Sir Henry Bessemer. Both inventions appeared almost simultaneously, and both were practically identical.

In any event, William Kelly received about a half-million dollars from his invention and ended his days in Louisville, Ky., an unknown genius, but respected citizen, while Bessemer secured about eight million dollars and knighthood for his invention.

Besides, the process was named after Sir Henry Bessemer, and the resulting product was named Bessemer Steel.

Kelly and Bessemer, both, realized that to produce an iron ore product suitable for commercial purposes, certain impurities must be eliminated.

THE "BIG FIVE" IMPURITIES

Iron ore is rarely found in a pure state. It is nearly always combined with dirt and impurities. The impurities found in the largest quantities are sulphur, carbon, manganese, phosphorous and silicon. These are the most common impurities and are recognized by all prominent metallurgists as the most dangerous to the finished material. They are known as the "Big Five."

A SIXTH HARMFUL IMPURITY

Copper is also found in iron ore—usually only a trace but frequently in large quantities. When the quantity is more than merely a trace copper is as dangerous to the finished material as any of the "Big Five" impurities.

Iron ore containing copper is undesirable and cheap because the copper is almost impossible to extract.

Kelly and Bessemer decided that carbon and silicon must be eliminated and more manganese be added to make possible the rolling of the material into bars, sheets and other forms.

They accomplished this by placing the molten metal into a huge pear-shaped retort and blowing a blast of air through the molten mass by way of holes at the bottom of the retort.

They literally burned out the carbon and silicon in this way.

But it is important to have a small amount of carbon in the metal in order to give the finished material the proper strength. So they threw in the needed amount of ferro-manganese, which is rich in both carbon and manganese.

A PAN-GROOVE ELEMENT

The sole value and only duty of manganese is to make the rolling of steel sheets a possibility. Otherwise it is a detriment to the metal sheet, because it stimulates corrosion.

So it is apparent that it must be carefully watched and controlled so that it performs only the function for which it is needed and is then rendered harmless.

Apparently the inventors of Bessemer Steel did not give the very important factor —durability—consideration, because Bessemer Steel proved to be a very short-lived material. Manganese, however, should not be blamed entirely for the non-durability of Bessemer Steel. There are other reasons, as we shall presently see.

Perhaps in their zeal to produce cheap steel that would answer the requirements of that day, they overlooked entirely the importance of making it durable.

A roar—a burst of flame—a shower of sparks. In about twenty minutes all is over and we have Bessemer Steel.

No scientific heat treatment and no time for testing. A sort of a shot in the dark. The process of burning out the carbon and silicon requires quick work.

But Sir Henry Bessemer and William Kelly accomplished their purpose. They gave to the world Steel at a cost within reason.

BORN—THE MODERN STEEL SHEET

The modern Steel Sheet was born. Crude, undeveloped and "uncivilized," it is true, but it was a start—something to work on—something to improve.

And improved upon it was. Hardly had the Bessemer process been registered when the Messrs. Siemens applied for a patent on an improved process for making Steel, but this process was not actually practicable until Martin, a Frenchman, improved it eight years later.

AN IMPROVEMENT

This was the Open Hearth process.

The Open Hearth process closely resembles the primitive methods, except that the heating and refining is done in huge, square-shaped furnaces and much quicker than by the hand method.

It requires from ten to twelve hours to produce one "heat" of steel, consequently there is more time than the Bessemer process permits and tests of the molten metal can be made to determine whether the analysis is suitable.

This, indeed, was a great stride in the sheet steel industry.

CIVILIZED?

If sheet metal was human and could talk, it would undoubtedly have said, "Now I am

fully civilized, I am refined, useful and low in cost. I can be bent and formed into many useful articles."

The Open Hearth Steel Sheet goes out proud and haughtily into the world. For years it was considered paramount in sheet metal quality. The world was delighted with its excellent quality and usefulness. And even today this grade of Open Hearth Steel is referred to as "that good old-fashioned iron."

A SAD AWAKENING

A sad awakening is in store for it, however. After a period of good behaviour, something seems to have happened to it. It doesn't give the good service it used to. It corrodes quickly.

What has happened to the quality of Open Hearth Steel Sheets? Nobody seems to be able to answer the question. And the question was destined to remain unanswered for about a quarter of a century.

SEMI-CIVILIZED

Then it was realized that the Steel Sheet required further "civilization."

The reason for Open Hearth Steel's decadence is two-fold.

THE REASON

First: Siemens and Martin, like Kelly and Bessemer, had only one object in view, and that was to produce a commercial steel sheet at a low price.

And they accomplished that. But nothing more. Quality was sacrificed.

Durability does not seem to have been given consideration; whether intentionally or unintentionally, we do not know.

However, by carefully selecting their raw materials, watching the process in every one of its stages, and producing the materials in very small quantities, they managed to produce a Steel Sheet that met the requirements and conditions of that period.

But the demand increased. More and varied uses were found for the Steel Sheet. So it was found necessary to produce Open Hearth Steel Sheets more rapidly and in larger quantities.

Of course, the more tons a manufacturer produced, the more money he obtained. More money was what he was after, and so —more tons it was.

Thus quality was sacrificed—first to price and then to quantity.

Then, to make matters worse for the steel sheet, the ever-increasing number of modern manufacturing plants using coal, coke and gas for fuel impregnated the atmosphere with smoke, gases, fumes, soot and cinder. And today the air is laden with severe corrosive influences that Kelly, Bessemer, Siemens and Martin apparently did not foresee.

These elements, coming in contact with sheet metal, attack it vigorously and cause it to corrode quickly if the sheet metal is not properly made.

And so the proud and haughty Steel Sheet finds that its "education" is not completed.

A MERE MEMORY

Today the "good old fashioned sheets" are a mere memory. Users everywhere extoll the sheets made in grandfather's day and bemoan the fact that they are no longer available.

But, of course, it is not generally known that as good as the "good old fashioned sheets" were when they were first produced, they would be inadequate for use under present-day severe atmospheric conditions.

They were not endowed with the power to combat modern corrosive influences.

NECESSITY—

Sheet metal users were clamoring for more durable sheet metal. Of course, they could use copper, zinc and the like, but those metals were entirely too high priced for most purposes. They wanted a durable sheet metal at a moderate price.

It must be corrosion-resisting, lend itself readily to the fabrication of the many sheet metal formed products, weld easily and be low in cost. In fact, it must be everything that the steel sheet is, but far more durable.

Here was a problem for the manufacturer.

THE MOTHER OF INVENTION

Years rolled by and none of the steel manufacturers heeded the cry. Perhaps the problem was too difficult to solve. Many may have tried and failed. Or, perhaps they were not willing to undertake the expenditure of time and money necessary to solve it. Necessity, the mother of invention, finally influenced prominent metallurgists and scientists to investigate.

For years this investigation was carried on quietly. Extensive researches established some very interesting facts.

AN IMPORTANT "FIND"

One important revelation was that the common impurities which all iron ore contains—carbon, sulphur, phosphorous, manganese, silicon and copper, caused steel sheets to corrode rapidly. During the production of steel these impurities have a tendency to group together and in the finished sheet these small groups are scattered irregularly in all sections of the sheet.

ELECTROLYSIS

These impurities do not "agree" with each other or with the iron in the sheet metal when present in large quantities and when grouped together in different portions of the sheet; then when the metal is exposed to moisture and air the same action takes

place as that in an electric battery—an electric current is set up and decomposition of the sheet metal occurs.

"Electrolysis" is the term given to this action by metallurgists.

Let us consider for a moment the electric battery.

In certain wet-cell batteries we find a zinc plate and a graphite plate immersed in a solution of sulphuric acid.

When these two plates are immersed in the acid solution and connected at the top with a copper wire, the zinc plate slowly begins to dissolve, or decompose, and an electric current is generated.

Note the fact that these two plates are of entirely different composition.

If they were both composed of the same matter, there would be no action—no chemical change—no electric current.

And so it is with the metal sheet made from iron ore.

When these impurities, entirely foreign to each other and to the iron in the sheet, group together, they serve in the same capacity as the zinc and graphite plates in the battery. An electric current is set up between these different groups and the sheet metal decomposes in spots.

CORROSION—A PLAGUE

That accounts for those familiar brown spots scattered irregularly over the surface of a steel sheet after being exposed to air and moisture.

After the brown spot comes the pin hole. The pin hole becomes larger and larger. Then finally the usefulness of the entire sheet is destroyed.

That's corrosion—the "white plague" of all iron ore products. A rapid and unnatural "death."

RUST—A NATURAL PROCESS

Rust is different.

Rust is really the union of iron and that part of the air which is known as oxygen.

A reddish-brown coating spreads evenly over the entire sheet and the metal sheet is oxidized.

When copper oxidizes it turns green. When zinc oxidizes it turns a greyish white. When an iron product oxidizes it turns a reddish brown—that's rust.

Compare iron rust with the iron ore from which the metal sheet is made and you will find that they are strangely alike—both iron oxide.

So, when the metal rusts it is slowly returning to its original state—iron oxide.

Nature is claiming her own. And this action cannot be prevented any more than man can be prevented from slowly deteriorating and finally returning to his original state—clay.

But a disease can be prevented; in the human being by training man to keep his system in proper condition, and in an inanimate object like a metal sheet it must be "trained" during its production so that it may combat that "white plague" of all iron ore products—corrosion.

THE INITIAL STEP

So, these investigators decided that it was essential to distribute these impurities uniformly throughout the sheet. In other words, make the sheet metal homogeneous; but to do this it was necessary, first, to reduce the impurities to the lowest possible point so that they could be easily controlled.

To eliminate these impurities from the iron ore entirely, was inadvisable, and, to a certain extent, impossible.

NECESSARY EVILS

Some of these impurities are actually useful and of great value to the finished metal sheet, as well as very important in the production of the sheet. It was inadvisable to remove these entirely.

Strange to say, some of the most harmful and least useful of these impurities are physically impossible to remove entirely.

Sulphur and Phosphorous for instance, are very dangerous elements in a sheet metal made from iron ore, and very difficult to control, reduce and remove.

SULPHUR

Sulphur accelerates corrosion. Besides, it injures the rolling quality of sheet metal while hot, causing it to crack and tear.

PHOSPHOROUS

Phosphorous makes sheet metal brittle when cold. It has a tendency to combine with the other impurities and accelerates corrosion.

CARBON

On the other hand, Carbon is needed to give the sheet strength, but if present in excess, it makes bending and forming of the metal sheet difficult.

MANGANESE

A very small percentage of manganese aids in the proper rolling of the metal sheet. But it is a severe accelerator of corrosion, particularly when it occurs in excess and when it combines with the other impurities.

SILICON

Silicon makes the rolling of sheet metal difficult, and spoils the working qualities of the finished sheet.

COPPER

Copper causes rapid corrosion. It has no value in the material and is almost impossi-

ble to extract. Sheet metal manufacturers usually avoid copper-bearing ore even for making ordinary steel sheets.

Many a weary day, and night too, was spent by these investigators in their efforts to determine the proper scientific methods for removing as much of the useless impurities as was possible to remove, and to reduce to exactly the proper point the impurities which were of some value.

IRON ORE SELECTION

Careful selection of just the right kind of iron ore, they found, helped to eliminate considerable work in production.

Iron ore containing copper was avoided particularly, because, as already mentioned, copper, when grouped with other impurities, is just as harmful as any of them, and it is impossible to extract and very difficult to control.

HOMOGENEITY

After it had been determined how to reduce these impurities to the proper point, the next problem was—how to distribute the infinitesimal amount of impurities still remaining in the material, uniformly, and to prevent their grouping together.

After years of experimenting and research this was finally accomplished.

Quite a stride in the manufacture of modern ferric sheet metal was this—the production of a homogeneous metal sheet.

But only half of the battle had been won.

THE CRYSTALLINE STRUCTURE

If we look through a microscope at a piece of iron or steel sheet, we will find that it is composed of minute crystals.

And as these investigators looked through a microscope at a piece of sheet metal, they found that these crystals were distorted. The sheet was full of fissures and pores.

Excellent receptacles for moisture and other corrosive influences were these openings.

What caused this condition?

Too rapid and careless fabrication.

For a better understanding of this, let us follow the process of making the metal sheet for a moment.

The molten metal flows from the open hearth furnace into an immense ladle, and from there it is poured into huge rectangular molds.

THE INGOT

When this mold is withdrawn it leaves a large rectangular chunk of metal, weighing from one to eight thousand pounds. This is called an "ingot."

Then this ingot is reduced to slabs or bars, varying in thickness from one-quarter to one inch, and from these bars the sheets are rolled.

What a tremendous amount of pressure—shock—strain and vibration that titanic chunk of metal undergoes until it becomes a thin sheet. And in a modern mill the ingot is literally shot through the different processes.

Crushed—pulled—pounded and twisted at a terrific speed. Is it any wonder that those crystals which form the structure of the sheet are distorted, and that the sheet is porous and full of crevices and fissures?

Scientific heat treatment before rolling and during the various stages of rolling, coupled with slower and more careful production would eliminate this and produce

more durable sheet metal, decided the metallurgists.

Then the annealing of the sheet came in for a careful investigation.

The object of the annealing process is to relieve the sheet metal as much as possible of the harmful effects of the stresses and strains occurring during rolling. The extreme heat to which the sheets are subjected during the annealing process tend to contract the pores, crevices and fissures in the sheet which were caused by the severe shocks during production.

This does not mean that the material may be crushed, pulled and pounded in a haphazard manner during production and then be placed in prime condition in the annealing furnace. The annealing furnace has its limitations, and where the crystalline structure of the sheet is severely distorted it can only be partly restored to a normal condition by careful and scientific annealing.

But the manufacturer who rushes the production of the material in its early stages will also rush the finishing touches—the annealing. Tonnage is the cry. Care, science and watchfulness are cast to the winds.

To produce the proper results in annealing, guess work must be eliminated.

The maximum temperature to be reached must be known, and when that degree is reached, the heat is turned off. The cooling process must start at just the critical moment. Special treatment before and after annealing improves the sheet. So found the metallurgists.

Exhaustive experimenting taught them important details that were either overlooked or unknown to producers of steel sheets. Their findings have proven to be invaluable.

GALVANIZING

Galvanizing was investigated next.

The coating of sheet metal with hot zinc is called "galvanizing," as nearly everyone knows.

A metal sheet is galvanized for two reasons—first, as a protection against rust and corrosion; second, for appearance.

Galvanized Sheet Metal will last longer than ungalvanized, without question. Galvanizing is a good method of protecting sheet metal.

But that coat of zinc is not permanent. It will eventually flake off or wear off. And when this happens, nothing is left but the bare base metal. Just as soon as the atmosphere reaches the base metal corrosion will attempt to attack it, and the attempt is a successful one if the sheet is of a grade similar to the steel sheets that have been produced for the last quarter of a century.

CONSIDER THE BASE METAL

An improperly galvanized steel sheet makes matters much worse. The zinc coating is full of minute pinholes, most of which are not visible to the naked eye. This brings the base metal directly in contact with the atmosphere and lays it open to attack by corrosion. The necessity for a more durable sheet metal than steel is apparent.

Steel sheets, as they have been made in the past, and as they are still being made, are quite soluble in molten zinc, which makes it very difficult to galvanize properly.

When the steel sheet is passed through the molten zinc, a small percentage of the sheet itself is dissolved and forms an alloy of iron and zinc. This, of course, remains in the zinc and becomes a part of the coating of the sheets that follow. This coating is much more subject to atmospheric influences than a pure zinc coating.

The metal sheet which these metallurgists were striving to evolve would overcome this difficulty. They felt that a metal sheet which was produced on a scientific basis in accordance with their findings would be insoluble in molten zinc, thus securing a better protective coating.

CONTINUED DEMAND FOR GALVANIZED SHEETS PREDICTED

For, no matter how durable a sheet metal would be produced, it was a certainty that the galvanized coating would still be demanded by the trade; first, because of its enhanced appearance; second, for the double protection it gave, and, third, because of the need for a sheet that could be soldered. And this has been proven true.

Patiently these metallurgists worked out every detail. In each case they determined, first, the cause; second, the effect; and, third, the remedy.

Many a weary day, and night, too, they experimented, studied and labored.

And then, finally, the ideal metal sheet was a reality.

THE REMEDY

Out of the crude iron ore was evolved a metal sheet that was able to resist the ravages of the most severe corrosive influences, a sheet that could be worked, formed up, bent and seamed; a sheet that could be galvanized with a pure coating of zinc; a sheet that could be bought by the ultimate con-

sumer at a low price; a sheet that has caused thousands of users to enthuse over it; a sheet in which there is truly *economy and durability in every ounce.*

Its makers called it "Toncan Metal."

"CIVILIZED" FERRIC SHEET METAL

Civilized at last! The metal sheet had completed its "education." A lost art was found and modernized to the extent that the extremely durable sheet metal which was made from iron ore four thousand years ago could now be made in larger quantities, within less time and at a much lower cost.

"THERE AIN'T NO SUCH ANIMAL"

Skeptics, skeptics everywhere. They could not and would not believe that a sheet metal could be produced from iron ore and be made to resist rust and corrosion. "There ain't no such animal."

And yet, they had every reason in the world to be skeptical. The product was new and untried. Sheets made from iron ore heretofore had been short-lived and their years of experience with this class of material had made them believe that just as long as it was made from iron ore it would deteriorate quickly.

Besides, this new material—Toncan Metal—*looked* exactly like steel, galvanized or uncoated. The naked eye could detect no difference.

It was apparent, therefore, that some method to demonstrate the superiority of Toncan Metal over other sheet metals made from iron ore was necessary.

THE ACCELERATED CORROSION TEST

Coincidently, just at this time, the since much-discussed accelerated corrosion test was suggested at a meeting of the American

Society for Testing Materials. The method was a very simple one.

A small piece of the metal to be tested is immersed in a twenty per cent solution of Chemically Pure Sulphuric Acid and allowed to remain there for a short period, say, twenty to sixty minutes.

The object of this was to show in a quick way what might be expected to happen in a slower way if the metals were exposed to the elements in ordinary service.

When Toncan Metal, steel and so-called iron sheets were subjected to the acid test, Toncan Metal always lasted longer than the other two metals.

This accelerated corrosion test helped to prove that Toncan Metal was a superior Sheet Metal. And after years of actual service in places where Steel could not last, Toncan Metal proved that the acid test told the truth, so far as it was concerned. Toncan Metal in actual use today is more than bearing out the claims made for it.

A LEGITIMATE TEST USED ILLEGITIMATELY

Both seller and purchaser found the accelerated corrosion test of value when used legitimately. But, like all other good things it was abused. Metallurgy was prostituted and it was found that by the addition of copper it was possible to produce a sheet metal for one specific purpose, and that is to resist the acid test—but the acid test only.

It seems strange that copper, which is an undesirable element even in ordinary steel sheets should be deliberately placed in steel. Yet the explanation is simple.

When a piece of steel containing copper is placed in the sulphuric acid to be tested,

the acid dissolves the copper from the steel. That leaves the steel immersed in a liquid containing copper.

The acid and the metal are both in the same vessel, and therefore the copper plates back over the surface of the steel in a very thin covering. This thin coating of copper prevents the piece of steel from being destroyed during the period of the test.

Under natural conditions when the steel is exposed to the weather, it can easily be understood that this plating back of the copper upon the surface of the steel is an impossibility, because, in the first place there are no elements in the atmosphere which are sufficiently active to actually dissolve the copper, and, in the second place, if in some manner the steel would come in contact with just the right solution of sulphuric acid and the copper were extracted, the copper would be lost because there would be no vessel to hold the solution.

In actual service steel sheets containing copper do not last as long as sheets which are free from copper.

Toncan Metal, however, resists the acid test because of its purity, homogeneity and the scientific methods used in its production —not because of any added ingredients.

THE ACTUAL SERVICE TEST

So, as far as Toncan Metal is concerned, the acid test is discarded. It is really not needed now. The actual service test supersedes the acid test.

An actual service test is really the best proof of the merits of any material.

Photographs of buildings and other places where Toncan Metal has been in use for years are available to all interested.

The evidence of Toncan Metal in use facilitates investigation. It shows at a glance what would otherwise require years to determine.

Those who specified and used Toncan Metal when it was still in its infancy, years ago, investigated first—then specified.

Today the discriminating buyer, user, sheet metal worker, architect or engineer is spared this trouble by the evidence in hand.

NEW USES DEVELOPED

The uses for Toncan Metal Sheets are many. Toncan Metal is not only being used for all purposes where sheet metal of any kind has ever been used, but its extreme durability and moderate cost has developed uses for which it has been impossible to employ sheet metal heretofore.

MANY USES

In this booklet will be found a few of its uses illustrated and described. Lack of space alone prevents illustrating the many different articles into which Toncan Metal can be fabricated and the various places where it can be used.

The user, seller or specifier of sheet metal who has experienced the annoyance and expense caused by short-lived sheet metal and has had no other alternative but to resort to prohibitive priced sheet metal for durability truly realizes the value of corrosion-resisting Toncan Metal Sheets.

And it is a source of satisfaction to be able to procure a durable sheet metal at a moderate price.

Section Two

Comparative Service Tests of

And a few typical Toncan Metal Installations

"One example is worth
a thousand arguments"—
Gladstone

EXHIBIT A

A Section of the Test Fence

The photographic reproductions on pages 28, 29, 30 and 31 show the superiority of Toncan Metal over steel by actual results in a service test.

In connection with our research laboratory we maintain a test fence on which we try out under actual and unaccelerated conditions all kinds of sheet metals.

The photo shown above is the remains of a steel sheet tested for almost eleven months under exactly identical conditions as the Toncan Metal Sheet shown on the next page.

The steel sheet is falling into pieces, being practically destroyed by corrosion and having almost no strength or life remaining. Note how an ordinary pencil can be pushed through the disintegrated steel sheet.

See affidavit on page 32.

EXHIBIT B

Another Section of the Test Fence

Here we see a Toncan Metal Sheet without paint, galvanizing or other protection, full of strength and life after being tested under conditions identical with those described on the preceding page.

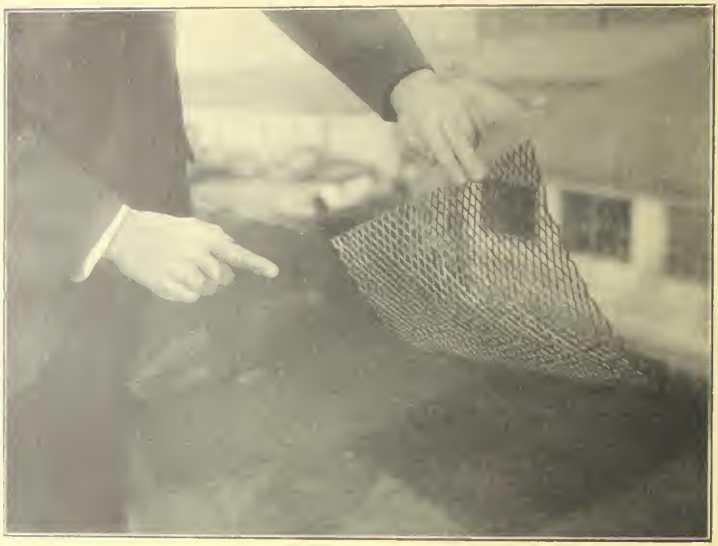
Both this sample and the one shown on page 28 show rust or oxidation, thus justifying our argument in favor of a protective coating, either paint or zinc spelter (galvanizing).

A good sheet protected by a reliable surface coating gives permanent results.

A poor sheet, even though coated, lasts only as long as the coating, causing excessive labor charges for frequent repair and replacement.

See affidavit on page 32.

EXHIBIT C



Portion of Test Fence

One of the most difficult tests to withstand is to cause a sheet to be perforated and then expanded or stretched out into expanded metal or lath, and then expose the uncoated lath to severe atmospheric or other influences.

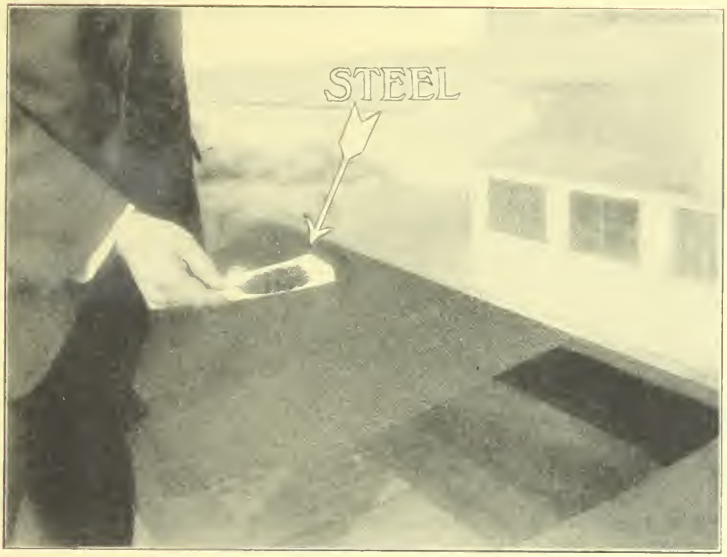
This photo shows a sheet of Toncan Metal Lath, strong and ductile, almost as good in every way as when placed on test fence 11 months previous.

For reinforced or stucco work, or wherever expanded metal is desired, Toncan Metal Lath should be used.

It may be obtained plain, painted or galvanized, and in any style, and will give prolonged and satisfactory service as compared with steel.

See affidavit on page 32.

EXHIBIT D



Partial View of Test Fence

This photograph shows a handful of rusted fragments tested under conditions identical with those to which the Toncan Metal Lath shown on the previous page were subjected. The original gauge in both cases was No. 24 U. S. standard or .025 inches thick. This exhibit is so conclusive that no comment is needed.

See affidavit on page 32.

STATE OF OHIO)
) ss
COUNTY OF STARK)

Personally appeared before me A. E. Hockwalt, Notary Public in and for State of Ohio, Stark County, J.T.Hay, who being sworn says that on January 9th 1912 he personally placed samples of one pass cold rolled steel and Toncan Metal sheets, uncoated, on the test fence maintained by Research Dept. of Stark Rolling Mill Co., and on Nov. 22, 1912 he took photographs shown herewith numbered A-B-C- and that said photographs represent the actual condition of these sample sheets after exposure for 10 months 18 days to atmosperic influences and the weather, and subject to no other influence.

J. T. Hays.
Chief Chemist

Fred Hockwalt
Notary Public.

Photographs described as Exhibits A, B, C and D are shown on pages 28, 29, 30 and 31 of this book.

The buildings shown on the next two pages are typical Toncan Metal installations and were selected at random from several thousand structures on which Toncan Metal is in use today.

In the "Evidence" book are shown a greater number of Toncan Metal installations and to the person who wants to be convinced of the recognized superiority of Toncan Metal this "Evidence" book will be of great service. It will be sent gratis on request.

Public Library Portland Branch Louisville, Ky.

Kansas City Ry. Terminal Kansas City, Mo. All Refrigerators Made From Toncan Metal

R. J. Reynolds & Co. Winston-Salem, N. C. Home of "Prince Albert Tobacco" Toncan Metal Used on All Buildings.

These photographs represent typical Toncan Metal installations and are only a few of several thousand. The "Evidence" Book, containing many photographs of prominent Toncan Metal installations, will be sent on request—gratis.

Savannah Hotel, Savannah, Ga.

Salina Co. Court House Salina, Kan.

Meridian Hotel Indianapolis, Ind.

These photographs represent typical Toncan Metal installations and are only a few of several thousand. The "Evidence" Book, containing many photographs of prominent Toncan Metal installations, will be sent on request—gratis.

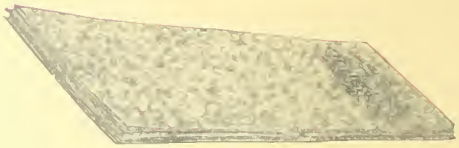
Section Three

Sheet Metal Manual for the Architect, Builder, Buyer, Seller and Sheet Metal Contractor

TONCAN METAL

"There is Durability and Economy in every ounce"

TONCAN METAL SHEETS



Black TONCAN Galvanized

A corrosion-resisting sheet metal at a moderate price, capable of combating the present day severe atmospheric conditions and which will also meet all the requirements of modern sheet metal practice was demanded by all users of sheet metal.

Toncan Metal supplied this demand to a degree that even exceeded the expectations of its makers.

Years of service under the most trying conditions—conditions that would rapidly corrode steel and make it worthless within a short time—service under such conditions has proved the true value of Toncan Metal—proved far beyond all possible doubt its wonderful rust-resisting and anti-corrosive properties.

To use Toncan Metal is a real economy—it is providing for the future as well as for the present.

This Trade Mark TONCAN Stenciled on every Sheet

Identification

The following is an exact facsimile of the stencil which appears on all genuine Toncan Metal Sheets in red:

THE STARK ROLLING MILL CO.
CANTON
O.
TONCAN
METAL
Reg. U. S. Pat. Off.

To protect the buyer, user and seller of Toncan Metal Corrosion-resisting Sheets and Formed Products the above stencil appears on each sheet of genuine Toncan Metal two feet apart.

For instance, sheets five feet long bear two stencils and longer sheets bear these stencils spaced two feet apart.

In this manner at least a portion of the well-known double-diamond stencil is visible when a sheet is cut up or formed up into various sheet metal products.

Positive substitution is eliminated by this method of identification, and the discriminating buyer, user or specifier of sheet metals who demands the highest quality always can be guided by the double-diamond Toncan Metal stencil in red.

For method of identifying genuine Toncan Metal Eaves Trough, Conductor Pipe, Elbows, Shoes, Cut-offs etc. See page 77.

Bundlings Weights of Black Toncan Metal Sheets

Gauge	10			11			12			14			16		
Ozs per sq ft Lb per sq ft Dec thick	90. 5.625 .140625″			80. 5. .125″			70. 4.375 .109375″			50. 3.125 .078125″			40. 2.50 .0625″		
Size of Sheet	Weight per Sheet	Sheets per Bundle	Weight per Bundle	Weight per Sheet	Sheets per Bundle	Weight per Bundle	Weight per Sheet	Sheets per Bundle	Weight per Bundle	Weight per Sheet	Sheets per Bundle	Weight per Bundle	Weight per Sheet	Sheets per Bundle	Weight per Bundle
24x 72	67.5	2	135	60.	3	180	52.5	3	157	37.5	4	150	30.	5	150
26x 72	73.13	2	146	65.	2	130	56.88	3	171	40.63	4	162	32.5	5	162
28x 72	78.75	2	157	70.	2	140	61.25	2	125	43.75	3	131	35.	4	140
30x 72	84.38	2	169	75.	2	150	65.63	2	131	46.88	3	141	37.5	4	150
32x 72	90.	2	180	80.	2	160	70.	2	140	50.	3	150	40.	3	120
34x 72	95.63	2	191	85.	2	170	74.38	2	150	53.13	3	160	42.50	3	127
36x 72	101.25	--	---	90.	2	180	78.75	2	157	56.25	3	169	45.	3	135
24x 84	78.75	2	157	70.	2	140	61.25	2	122	43.75	3	131	35.	4	140
26x 84	85.31	2	171	75.83	2	152	66.35	2	133	47.4	3	142	37.92	4	152
28x 84	91.88	2	184	81.67	2	163	71.46	2	143	51.04	3	153	40.83	4	163
30x 84	98.44	--	---	87.5	2	175	76.56	2	153	54.69	3	164	43.75	3	131
32x 84	105.	--	---	93.33	2	187	81.67	2	163	58.33	3	174	46.67	3	140
34x 84	111.56	--	---	99.17	--	---	86.77	2	174	61.98	2	123	40.58	3	140
36x 84	118.13	--	---	105.	--	---	91.88	2	184	65.63	2	131	52.5	3	157
24x 96	90.	2	180	80.	2	160	70.	2	140	50.	3	150	40.	4	160
26x 96	97.5	2	195	86.67	2	173	75.83	2	152	54.17	3	162	43.33	3	130
28x 96	105.	--	---	93.33	2	187	81.67	2	163	58.33	3	175	46.67	3	140
30x 96	112.5	--	---	100.	--	---	87.5	2	175	62.5	2	125	50.	3	150
32x 96	120.	--	---	106.67	--	---	93.33	2	187	66.67	2	133	53.33	3	160
34x 96	130.16	--	---	113.33	--	---	99.17	--	---	70.83	2	141	56.67	3	170
36x 96	135.	--	---	120.	--	---	105.	--	---	75.	2	150	60.	2	160
24x101	94.69	--	---	84.17	2	168	73.65	2	147	52.6	3	158	42.08	4	168
26x101	102.58	--	---	91.18	2	182	79.78	2	159	57.	3	171	45.59	3	137
28x101	110.47	--	---	98.19	2	196	85.92	2	172	61.37	2	123	49.09	3	147
30x101	118.36	--	---	105.21	--	---	92.06	2	184	65.76	2	131	52.6	3	158
32x101	126.25	--	---	112.22	--	---	98.19	2	196	70.14	2	141	56.11	2	112
34x101	134.14	--	---	120.42	--	---	104.33	--	---	74.52	2	149	59.03	2	118
36x101	142.02	--	---	126.25	--	---	110.47	--	---	78.91	2	158	63.13	2	126
24x108	101.25	--	---	90.	2	180	78.75	2	157	56.25	3	169	45.	3	135
26x108	109.69	--	---	97.5	2	195	85.31	2	171	60.94	2	122	48.75	3	146
28x108	118.13	--	---	105.	--	---	91.88	2	184	65.63	2	131	52.5	3	157
30x108	126.56	--	---	112.5	--	---	98.44	--	198	70.31	2	141	56.25	3	169
32x108	135.	--	---	120.	--	---	105.	--	---	75.	2	150	60.	2	120
34x108	143.44	--	---	127.50	--	---	111.56	--	---	79.69	2	159	63.75	2	127
36x108	151.88	--	---	135.	--	---	118.13	--	---	84.38	2	169	67.5	2	135
24x120	112.5	--	---	100.	--	---	87.5	2	175	62.5	2	125	50.	3	150
26x120	121.88	--	---	108.33	--	---	94.79	2	198	67.71	2	135	54.17	3	162
28x120	131.25	--	---	116.67	--	---	102.08	--	---	72.92	2	146	58.33	3	175
30x120	140.63	--	---	125.	--	---	109.33	--	---	78.13	2	156	62.5	2	125
32x120	150.	--	---	133.33	--	---	116.67	--	---	83.33	2	166	66.67	2	133
34x120	159.38	--	---	141.67	--	---	123.96	--	---	88.54	2	177	70.83	2	140
36x120	168.75	--	---	150.	--	---	131.25	--	---	93.75	2	187	75.	2	150

Toncan Metal can also be procured in 13, 15 and 17 gauges.

Toncan Metal Galvanized Sheets are very soft and ductile and form up excellently without danger of breaking. Only prime western spelter is used in galvanizing, assuring a bright and continuous coating. In the manufacture of formed sheet metal products where appearance, durability and economy are factors the use of Toncan Metal will produce the desired results.

This Trade Mark TONCAN METAL *Stenciled on every Sheet*

Bundling Weights of Black Toncan Metal Sheets
(Concluded)

Gauge	18			20			22			24			26		
Ozs per sq ft Lbs per sq ft Dec thick	32. 2. .05″			22. 1.5 .0375″			20. 1.25 .03125″			16. 1. .025″			12. .75 .01875″		
Size of Sheet	Weight per Sheet	Sheets per Bundle	Weight per Bundle	Weight per Sheet	Sheets per Bundle	Weight per Bundle	Weight per Sheet	Sheets per Bundle	Weight per Bundle	Weight per Sheet	Sheets per Bundle	Weight per Bundle	Weight per Sheet	Sheets per Bundle	Weight per Bundle
24x 72	24.	6	144	18.	8	144	15.	10	150	12.	12	144	9.	16	144
26x 72	26.	6	156	19.5	8	156	16.25	9	146	13.	11	143	9.75	15	146
28x 72	28.	5	140	21.	7	147	17.5	8	140	14.	11	154	10.5	14	147
30x 72	30.	5	150	22.5	7	157	18.75	8	150	15.	10	150	11.25	13	146
32x 72	32.	4	128	24.	6	144	20.	7	140	16.	9	144	12.	12	144
34x 72	34.	4	136	25.5	6	153	20.95	7	146	17.	9	153	12.75	11	140
36x 72	36.	4	144	27.	5	135	22.5	7	157	18.	8	144	13.5	11	148
24x 84	28.	5	140	21.	7	147	17.5	8	140	14.	11	154	10.5	14	147
26x 84	30.33	5	152	22.75	7	159	18.96	8	152	15.16	10	152	11.38	13	148
28x 84	32.67	5	163	24.5	6	147	20.42	7	143	16.33	9	147	12.25	12	147
30x 84	35.	4	140	26.25	6	157	21.88	7	153	17.5	8	140	13.13	11	144
32x 84	37 33	4	150	28.	5	140	23.33	6	140	18.66	8	149	14.	10	140
34x 84	39.67	4	158	29.75	5	149	24.79	6	149	19.83	7	139	14.88	10	149
36x 84	42.	4	168	31.5	5	157	26.25	6	157	21.	7	147	15.75	9	142
24x 96	32.	5	160	24.	6	144	20.	7	140	16.	9	144	12.	12	144
26x 96	34.67	4	139	26.	6	156	21.67	7	152	17.33	9	156	13.	11	143
28x 96	37.33	4	149	28.	5	140	23.33	6	140	18.67	8	149	14.	11	154
30x 96	40.	4	160	30.	5	150	25.	6	150	20.	7	140	15.	10	150
32x 96	42.67	3	127	32.	4	128	26.67	5	134	21.33	7	149	16.	9	144
34x 96	45.33	3	136	34.	4	136	28.33	5	142	22.90	6	138	17.	9	143
36x 96	48.	3	144	36.	4	144	30.	5	150	24.	6	144	18.	8	144
24x101	33.67	4	135	25.25	6	151	21.04	7	147	16.83	9	151	12.63	12	151
26x101	36.47	4	146	27.35	5	137	22.79	7	159	18.24	8	146	13.68	11	150
28x101	39.28	4	157	29.46	5	147	24.55	6	147	19.64	8	157	14.73	10	147
30x101	42.08	4	168	31.56	5	158	26.3	6	158	21.04	7	147	15.78	9	142
32x101	44.89	3	135	33.67	4	135	28.05	5	140	22.44	7	156	16.67	9	150
34x101	47.69	3	143	35.77	4	143	29.81	5	149	23.84	6	143	17.71	8	142
36x101	50.5	3	151	37.88	4	151	31.56	5	158	25.25	6	151	18.94	8	151
24x108	36.	4	144	27.	5	135	22.5	7	157	18.	8	144	13.5	11	148
26x108	39.	4	156	29.25	5	146	24.37	6	146	19.5	8	156	14.63	10	146
28x108	42.	4	168	31.5	5	157	26.25	6	157	21.	7	147	15.75	9	142
30x108	45.	3	135	33.75	4	135	28.12	5	141	22.5	7	157	16.88	9	152
32x108	48.	3	144	36.	4	144	30.	5	150	24.	6	144	18.	8	144
34x108	51.	3	153	38.25	4	153	31.87	5	159	25.5	6	153	19.13	8	153
36x108	54.	3	162	40.5	4	162	33.75	5	169	27.	6	162	20.25	7	142
24x120	40.	4	160	30.	5	150	25.	6	150	20.	7	140	15.	10	150
26x120	43.33	3	130	32.5	5	162	27.08	6	162	21.67	7	152	16.25	9	146
28x120	46.67	3	140	35.	4	140	29.17	5	146	23.33	6	140	17.5	8	140
30x120	50.	3	150	37.5	4	150	31.25	5	156	25.	6	150	18.75	8	150
32x120	53.33	3	160	40.	3	120	33.33	4	134	26.66	5	134	20.	7	140
34x120	57.13	2	115	42.5	3	128	35.42	4	142	28.33	5	142	21.43	7	150
36x120	60.	2	120	45.	3	135	37.5	4	150	30.	5	150	22.5	7	157

Toncan Metal can also be procured in 19, 21, 23 and 25 gauges.

Toncan Metal Blue Annealed Sheets can be furnished in gauges 16 to 7 inclusive. As this must be rolled special, less than 4,000 pounds per item cannot be furnished. These Blue Annealed Sheets are suitable for flat work only. Where sheets are required for forming and bending One Pass Cold Rolled Toncan Metal Sheets should be used.

This Trade Mark TONCAN METAL *Stenciled on every Sheet*

Bundling Weights of Galvanized Toncan Metal Sheets

Gauge	10			11			12			14			16		
Ozs per sq ft Lbs per sq ft	92.5 5.781			82.5 5.156			72.5 4.531			52.5 3.281			42.5 2.656		
Size of Sheet	Weight per Sheet	Sheets per Bundle	Weight per Bundle	Weight per Sheet	Sheets per Bundle	Weight per Bundle	Weight per Sheet	Sheets per Bundle	Weight per Bundle	Weight per Sheet	Sheets per Bundle	Weight per Bundle	Weight per Sheet	Sheets per Bundle	Weight per Bundle
24x 72	69.37	2	139	61.87	3	186	54.37	3	163	39.37	4	157	31.87	5	159
26x 72	75.16	2	150	67.03	2	134	58.91	3	177	42.66	4	171	34.53	4	138
28x 72	80.94	2	162	72.19	2	144	63.44	2	127	45.94	3	138	37.19	4	149
30x 72	86.72	2	173	77.34	2	155	67.97	2	136	49.22	3	148	39.84	4	159
32x 72	92.49	2	185	82.49	2	166	72.48	2	144	52.48	3	157	42.40	4	170
34x 72	98.27	2	196	87.65	2	176	77.02	2	154	55.79	3	168	45.15	3	138
36x 72	104.06	2	208	92.81	2	186	81.56	2	163	59.06	3	177	47.81	3	143
24x 84	80.94	2	162	72.19	2	144	63.44	2	127	45.94	3	138	37.19	4	149
26x 84	87.64	2	175	78.17	2	156	68.69	2	137	49.74	3	149	40.27	4	161
28x 84	94.41	2	189	84.20	2	168	74.00	2	148	53.58	3	161	43.38	4	174
30x 84	101.17	2	202	90.23	2	180	79.30	2	159	57.42	3	172	46.48	3	139
32x 84	107.87	2	216	96.21	2	194	83.68	2	167	61.56	3	185	49.47	3	148
34x 84	114.63	1	115	102.24	2	205	89.84	2	180	65.06	2	132	52.66	3	159
36x 84	121.41	1	121	108.28	2	217	95.16	2	190	68.91	2	138	55.78	3	167
24x 96	92.50	2	185	82.50	2	165	72.50	2	145	52.50	3	157	42.50	4	170
26x 96	100.19	2	200	89.36	2	179	78.53	2	157	56.86	3	171	46.03	3	138
28x 96	107.88	2	216	96.22	2	192	84.55	2	169	61.23	3	184	49.57	3	149
30x 96	115.62	2	231	103.12	2	206	90.62	2	181	65.62	2	131	53.12	3	159
32x 96	123.31	1	123	109.97	2	220	96.61	2	193	69.97	2	140	56.53	3	170
34x 96	130.99	1	131	116.83	1	117	102.67	1	103	74.34	2	150	60.18	3	183
36x 96	138.75	1	139	123.75	1	124	108.75	1	109	78.75	2	157	63.75	2	127
24x108	104.05	2	208	92.80	2	186	81.55	2	164	59.06	3	177	47.70	3	143
26x108	112.72	2	226	100.54	2	201	88.35	2	178	63.96	2	128	51.67	3	155
28x108	121.40	1	122	108.27	2	218	95.15	2	192	68.89	2	138	55.65	3	167
30x108	130.07	1	131	116.01	2	234	101.94	2	204	73.82	2	148	59.62	3	179
32x108	138.74	1	139	123.74	1	124	108.74	2	218	78.72	2	157	63.60	2	127
34x108	147.41	1	148	131.47	1	132	115.54	1	116	83.66	2	168	67.72	2	136
36x108	156.08	1	156	139.21	1	140	122.33	1	123	88.59	2	177	71.55	2	143
24x120	115.62	2	231	103.12	2	206	90.62	2	181	65.62	2	131	53.12	3	159
26x120	125.22	1	125	111.68	1	112	98.15	2	196	71.07	2	142	57.53	3	173
28x120	134.88	1	135	120.30	1	120	105.71	2	211	76.55	2	153	61.97	3	186
30x120	144.53	1	145	128.91	1	129	113.28	1	113	82.03	2	164	66.41	2	133
32x120	154.12	1	154	137.45	1	138	120.79	1	121	84.47	2	175	70.67	2	141
34x120	163.77	1	164	146.06	1	147	128.36	1	129	92.95	2	184	75.24	2	152
36x120	173.44	1	174	154.69	1	155	135.94	1	136	98.44	2	197	79.69	2	159

10 gauge is the heaviest Galvanized Toncan Metal Sheets made.

Any specified weight more than 2½ per cent., gauges 17 and lighter, and 5 per cent., gauges 16 and heavier, light to U. S. Standard Gauge, to be quoted on basis of next lighter gauge.

Items of odd size less than 4,000 pounds cannot be furnished.

Note—Toncan Metal is not furnished lighter than No. 26 Gauge Black and No. 28 Gauge Galvanized.

This Trade Mark TONCAN METAL *Stenciled on every Sheet*

Bundling Weights of Galvanized Toncan Metal Sheets
(Continued)

Gauge	18			19			20			21			23		
Ozs per sq ft	34.5			30.5			26.5			22.5			20.5		
Lbs per sq ft	2.156			1.906			1.656			1.406			1.281		
Size of Sheet	Weight per Sheet	Sheets per Bundle	Weight per Bundle	Weight per Sheet	Sheets per Bundle	Weight per Bundle	Weight per Sheet	Sheets per Bundle	Weight per Bundle	Weight per Sheet	Sheets per Bundle	Weight per Bundle	Weight per Sheet	Sheets per Bundle	Weight per Bundle
24x 72	25.87	6	155	22.87	7	160	19.87	8	159	16.87	9	152	15.37	10	154
26x 72	28.04	5	140	24.78	6	149	21.53	7	151	18.28	8	146	16.66	9	150
28x 72	30.19	5	151	26.69	6	160	23.19	7	162	19.69	8	158	17.94	9	161
30x 72	32.34	5	162	28.59	5	143	24.84	6	149	21.09	7	148	19.22	8	154
32x 72	34.40	5	172	30.49	5	153	26.49	6	159	22.49	7	158	20.50	8	164
34x 72	36.67	4	147	32.40	4	130	28.13	5	141	23.90	6	144	21.78	7	152
36x 72	38.81	4	155	34.31	4	137	29.81	5	149	25.31	6	152	23.06	7	161
24x 84	30.19	5	151	26.69	6	160	23.19	7	162	19.69	8	158	17.94	9	161
26x 84	32.69	5	163	28.90	5	144	25.11	6	151	21.32	7	149	19.43	8	155
28x 84	35.21	4	141	31.13	5	156	27.05	5	135	22.96	7	161	20.93	7	147
30x 84	37.73	4	151	33.36	5	167	28.98	5	145	24.61	6	148	22.43	7	157
32x 84	40.13	4	161	35.57	4	143	30.80	5	154	26.13	6	157	23.80	7	168
34x 84	42.84	3	129	37.79	4	152	32.83	4	132	27.88	5	140	25.40	6	150
36x 84	45.28	3	136	40.03	4	160	34.78	4	140	29.53	5	148	26.91	6	161
24x 96	34.50	4	138	30.50	5	153	26.50	6	159	22.50	7	157	20.50	7	143
26x 96	37.37	4	149	33.04	5	165	28.70	5	143	24.35	6	146	22.20	7	155
28x 96	40.24	4	161	35.57	4	143	30.91	5	155	26.24	6	157	23.91	6	143
30x 96	43.12	4	172	38.13	4	152	33.13	5	166	28.13	7	141	25.63	6	154
32x 96	45.87	4	183	40.63	4	164	35.20	5	176	29.87	7	149	27.23	6	163
34x 96	48.85	3	147	43.18	3	130	37.52	4	150	31.83	5	160	29.03	6	174
36x 96	51.79	3	156	45.75	3	137	39.75	4	160	33.75	5	169	30.78	5	154
24x108	38.70	4	155	34.30	4	140	29.70	5	149	25.30	6	152	23.06	6	144
26x108	41.93	4	168	37.16	4	152	32.18	5	161	27.40	5	137	24.98	6	150
28x108	45.15	3	135	40.02	4	160	34.65	4	139	29.40	5	147	26.80	6	161
30x108	48.38	3	145	42.85	4	172	37.11	4	149	31.61	5	158	28.84	5	144
32x108	51.60	3	155	45.74	3	138	39.60	4	158	33.60	4	134	30.74	5	154
34x108	54.97	3	165	48.60	3	146	42.28	3	127	35.83	4	143	32.66	5	163
36x108	58.08	3	174	51.46	3	156	44.55	3	134	37.80	4	151	34.58	5	173
24x120	43.12	3	129	38.12	4	152	33.12	3	100	28.12	4	113	25.62	5	128
26x120	46.70	3	140	41.29	4	165	35.87	4	144	30.46	5	152	27.73	5	139
28x120	50.31	3	151	44.47	3	133	38.56	4	154	32.81	5	164	29.89	5	149
30x120	53.91	3	162	47.66	3	143	41.41	4	166	35.16	4	141	32.05	5	160
32x120	57.53	3	173	50.81	3	153	44.06	4	176	37.43	4	150	34.13	5	171
34x120	61.07	2	122	54.09	3	163	46.93	4	188	39.83	4	159	36.28	4	145
36x120	64.69	2	129	57.19	3	172	49.69	3	149	42.19	4	169	38.48	4	154

Toncan Metal can also be procured in 13, 15, 17 and 21 gauges

Toncan Metal Tight Coated Sheets can be furnished without extra charge. They are particularly suited for window frame purposes where severe bending and forming is necessary, but where appearance is a factor, the regular galvanized sheets should be used.

Ask for samples before ordering.

This Trade Mark *Stenciled on every Sheet*

Bundling Weights of Galvanized Toncan Metal Sheets

(Concluded)

Gauge Galv.	24			25			26			27			28		
Ozs per sq ft	18.5			16.5			14.5			13.5			12.5		
Lbs per sq ft	1.156			1.031			.9062			.8437			.7812		
Size of Sheet	Weight per Sheet	Sheets per Bundle	Weight per Bundle	Weight per Sheet	Sheets per Bundle	Weight per Bundle	Weight per Sheet	Sheets per Bundle	Weight per Bundle	Weight per Sheet	Sheets per Bundle	Weight per Bundle	Weight per Sheet	Sheets per Bundle	Weight per Bundle
24x 72	13.87	11	153	12.37	12	148	10.87	14	152	10.12	15	152	9.37	16	150
26x 72	15.03	10	150	13.41	11	148	11.78	13	153	10.97	14	154	10.16	15	152
28x 72	16.19	9	146	14.44	11	159	12.69	12	152	11.81	13	154	10.94	14	153
30x 72	17.34	9	156	15.47	10	155	13.59	11	149	12.66	12	152	11.72	13	152
32x 72	18.40	9	156	16.49	9	153	14.40	11	158	13.49	12	162	12.50	13	163
34x 72	19.65	8	160	17.52	9	162	15.40	10	154	14.34	10	144	13.28	11	154
36x 72	20.81	7	146	18.56	8	148	16.31	9	147	15.19	10	152	14.06	11	155
24x 84	16.19	9	146	14.44	11	159	12.69	12	152	11.81	13	154	10.94	14	153
26x 84	17.53	8	140	15.63	10	156	13.74	11	151	12.79	12	153	11.84	13	154
28x 84	18.88	8	151	16.84	9	152	14.80	10	148	13.78	11	152	12.76	12	153
30x 84	20.23	7	142	18.05	8	144	15.86	10	159	14.77	10	148	13.67	11	150
32x 84	21.47	7	150	19.23	8	160	16.80	10	168	15.74	10	157	14.59	11	160
34x 84	22.92	6	138	20.44	8	168	17.96	8	144	16.73	9	153	15.49	10	155
36x 84	24.28	6	146	21.66	7	152	19.03	8	152	17.72	9	159	16.41	9	148
24x 96	18.50	8	148	16.50	9	148	14.50	10	145	13.50	11	148	12.50	12	150
26x 96	20.04	8	160	17.87	8	143	15.71	10	157	14.62	10	146	13.54	11	149
28x 96	21.58	7	151	19.24	8	154	16.91	9	152	15.74	10	157	14.58	10	146
30x 96	23.12	7	162	20.62	7	144	18.12	8	145	16.87	9	152	15.62	10	156
32x 96	24.53	7	172	21.99	7	154	19.20	8	154	17.98	9	162	16.66	10	167
34x 96	26.19	6	162	23.36	7	168	20.53	8	168	19.11	8	160	17.70	9	162
36x 96	27.75	6	166	24.75	6	148	21.75	7	152	20.25	8	162	18.75	8	150
24x108	20.70	7	145	18.55	8	152	16.20	9	146	15.17	10	152	14.06	11	155
26x108	22.43	7	157	20.10	8	160	17.55	9	158	16.44	9	148	15.23	10	152
28x108	24.15	6	145	21.65	8	176	18.90	8	151	17.70	8	142	16.40	9	148
30x108	25.88	6	155	23.19	7	168	20.25	7	142	18.97	8	152	17.52	9	158
32x108	27.60	5	138	24.74	7	175	21.60	7	151	20.23	7	142	18.74	8	150
34x108	29.47	5	150	26.29	6	162	23.10	6	144	20.51	7	147	19.92	7	140
36x108	31.05	5	155	27.83	6	168	24.30	6	146	22.76	7	159	21.09	7	148
24x120	23.12	7	162	20.62	7	144	18.12	8	145	16.87	9	152	15.62	10	156
26x120	25.04	6	150	22.34	7	156	19.63	8	157	18.28	8	146	16.92	9	152
28x120	26.98	6	162	24.06	6	144	21.14	7	148	19.68	8	157	18.23	8	146
30x120	28.91	5	145	25.78	6	155	22.66	7	159	21.09	7	148	19.53	8	156
32x120	30.67	5	153	27.48	5	140	24.00	7	168	22.48	7	147	20.83	8	167
34x120	33.32	5	170	29.72	5	150	25.67	6	156	23.90	6	144	22.13	7	161
36x120	34.69	5	173	30.94	5	155	27.19	6	163	25.31	6	152	23.44	7	164

Besides being used for Roofing, Siding, Eaves Trough, Conductor Pipe, Metal Lath, Ventilators, Skylights and other building materials, Toncan Metal is used very extensively for Signs, Tanks, Culverts, Flumes, Silos, Refrigerators, Grain Bins, Brick Pallets, Gas Machines, Washing Machines, Car Roofs, Passenger Cars, Box Cars, Metal Posts and many other purposes too numerous to mention.

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Weight and Thickness of Black Toncan Metal Sheets In Various Gauges (U. S. Standard)

No. of Gauge	Approx. Thick. in Frac. of an Inch	Thickness in Decimal Parts of an Inch	Thickness in Millimeters	Weights per Sq. Ft. in Pounds	Weights per Sq. Ft. Ounces	Weights per Sq. Ft. Kilograms	Weights per Sq. Met. Kilograms	Weights per Sq. Met. Pounds
0000000	1/2	.5	12.7	20.00	320	9.072	97.65	215.28
000000	15/32	.46875	11.90625	18.75	300	8.505	91.55	201.82
00000	7/16	.4375	11.1125	17.50	280	7.983	85.44	188.37
0000	13/32	.40625	10.31875	16.25	260	7.371	79.33	174.91
000	3/8	.375	9.525	15.	240	6.804	73.24	161.46
00	11/32	.34375	8.73125	13.75	220	6.237	67.13	148.00
0	5/16	.3125	7.9375	12.50	200	5.67	61.03	134.55
1	9/32	.28125	7.14375	11.25	180	5.103	54.93	121.09
2	17/64	.265625	6.746875	10.625	170	4.819	51.88	114.37
3	1/4	.25	6.35	10.	160	4.536	48.82	107.64
4	15/64	.234375	5.953125	9.375	150	4.252	45.77	100.91
5	7/32	.21875	5.55625	8.75	140	3.969	42.72	94.18
6	13/64	.203125	5.159375	8.125	130	3.685	39.67	87.45
7	3/16	.1875	4.7625	7.5	120	3.402	36.62	80.72
8	11/64	.171875	4.365625	6.875	110	3.118	33.57	74.00
9	5/32	.15625	3.96875	6.25	100	2.835	30.52	67.27
10	9/64	.140625	3.571875	5.625	90	2.552	27.46	60.55
11	1/8	.125	3.175	5.	80	2.268	24.41	53.82
12	7/64	.109375	2.778125	4.375	70	1.984	21.36	47.09
13	3/32	.19375	2.38125	3.75	60	1.701	18.31	40.36
14	5/64	.078125	1.984375	3.125	50	1.417	15.26	33.64
15	9/128	.0703125	1.7859375	2.8125	45	1.276	13.73	30.27
16	1/16	.0625	1.5875	2.5	40	1.134	12.21	26.91
17	9/160	.05625	1.42875	2.25	36	1.021	10.99	24.22
18	1/20	.05	1.27	2.	32	.9072	9.765	21.53
19	7/160	.04375	1.11125	1.75	28	.7983	8.544	18.84
20	3/80	.0375	.9525	1.50	24	.6804	7.324	16.15
21	5/160	.034375	.873125	1.375	22	.6237	6.713	14.80
22	1/32	.03125	.79375	1.25	20	.567	6.103	13.46
23	9/320	.028125	.714375	1.125	18	.5103	5.493	12.11
24	1/40	.025	.635	1.	16	.4536	4.882	10.76
25	7/320	.021875	.555625	.875	14	.3969	4.272	9.42
26	3/160	.01875	.47625	.75	12	.3402	3.662	8.07

Thickness of Galvanized Toncan Metal Sheets

Gauge	U. S.	Birm.	B. & S.
10	.147	.14	.1324
11	.1289	.1259	.096
12	.1133	.11465	.086
13	.09765	.10045	.07732
14	.082025	.08827	.0692
15	.074212	.077325	.06202
16	.0664	.0674	.05577
17	.06015	.0629	.0499
18	.0539	.05387	.0449
19	.0489	.0467	.0404
20	.0414	.0395	.0364
21	.03783	.03722	.0329
22	.03515	.0324	.0295
23	.03215	.0294	.0268
24	.02915	.02627	.0243
25	.0258	.02422	.0221
26	.02265	.0222	.0201
27	.02109	.02017	.0183
28	.01952	.01812	.01675

Allowable Variation

Owing to the impossibility of rolling sheets to exact weights, an allowable variation is customary, No. 17 and lighter, 2½%; No. 16 and heavier, 5%.

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Maximum Rolling Sizes of Toncan Metal Sheets

Width, inches	48	46	44	42	40	38
Gauge	LENGTH IN INCHES.					
No. 7 and 8	120	120	120	120	120	120
No. 9 and 10	168	168	168	168	168	156
No. 11 and 12	168	168	168	168	168	168
No. 13 and 14	156	156	156	156	156	156
No. 15 and 16	156	156	156	156	156	156
No. 17 and 18	.....	.....	.....	.....	.....	120
No. 19 and 20	.....	.....	.....	.....	.....	144
No. 21	.....	.....	.....	.....	.....	144
No. 22	.....	.....	.....	.....	.....	144
No. 23 and 24	.....	.....	.....	.....	.....	144
No. 25 and 26	.....	.....	.....	.....	.....	120
No. 27	.....	.....	.....	.....	.....	120
No. 28	.....	.....	.....	.....	.....	.....

Width, inches	36	34	32	30	28	26	24
Gauge	LENGTH IN INCHES.						
No. 7 and 8	120	120	120	120	120	120	120
No. 9 and 10	156	156	156	144	144	144	168
No. 11 and 12	168	168	168	144	144	144	168
No. 13 and 14	156	144	144	144	144	144	156
No. 15 and 16	156	144	144	144	144	144	144
No. 17 and 18	144	144	144	144	144	120	120
No. 19 and 20	144	144	144	144	144	144	144
No. 21	144	144	144	144	144	144	144
No. 22	144	144	144	144	144	144	144
No. 23 and 24	144	144	144	144	144	144	144
No. 25 and 26	144	144	144	144	144	144	144
No. 27	144	144	144	144	144	144	144
No. 28	144	144	144	144	144	144	144

Above sizes apply to Black and Galvanized except in latter our maximum length is 144 inches.

Estimate of Number of Square Feet Toncan Metal Required to Cover 100 Square Feet of Surface with 2-inch Corrugated Toncan Metal.

End Lap	1 inch	2 inches	3 inches	4 inches	5 inches	6 inches
Side Lap, 1 Corrug'n	110	111	112	113	114	115
Side Lap, 1½ "	116	117	118	119	120	121
Side Lap, 2 "	123	124	125	126	127	128

With 1¼-Inch Corrugated Toncan Metal

End Lap	1 inch	2 inches	3 inches	4 inches	5 inches	6 inches
Side Lap, 1 Corrug'n	107 2/5	108 4/5	109 7/10	110 9/10	112 1/10	113 1/4
Side Lap, 1½ "	110 4/5	111 2/5	112 7/10	113 9/10	115 1/10	116 2/5
Side Lap, 2 "	113 1/10	114 1/5	115 3/10	117	118 1/4	120 2/5

These tables are based on using 96-inch sheets; if longer or shorter lengths are used, there will be a slight variation from the above estimate.

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Roofing and Siding

Standard Weights in Pounds per Square

Galvanized

Gauge Number	28	27	26	24	22	20
2, 2½, 3 and 5 in. Corrugated	83	91	98	124	151	178
⅜ and 1¼ in. Corrugated	87	94	101	129	157	185
V-Crimped, without Sticks	85	91	98	125	152	179
3 V-Crimped, without Sticks	89	95	102	130	158	186
Pressed Standing Seam, with Cleats	97	94	103	128	156	184
Roll Roofing, without Cleats	78	85	102	130	156	
Roll and Cap Roofing, with Caps and Cleats	93	100	106	134		
Beaded Ceiling	85	91	98	125		
Weatherboard Siding	86	93	102	130	158	
Plain Brick Siding	78	83	90	118		
Rock Face Brick and Stone Siding	70	80	92			

Painted

Gauge Number	28	27	26	24	22	20
2, 2½, 3 and 5 in. Corrugated	68	76	83	110	135	163
⅜ and 1¼ in. Corrugated	72	79	88	114	142	170
V-Crimped, without Sticks	70	76	83	110	137	163
3 V-Crimped, without Sticks	72	79	86	114	142	170
Pressed Standing Seam, with Cleats	73	79	86	113	141	169
Roll Roofing, without Cleats	72	79	90	114	142	
Roll and Cap Roofing, with Caps and Cleats	77	84	91	119		
Beaded Ceiling	70	76	83	110		
Weatherboard Siding	72	79	86	113	142	
Plain Brick Siding	64	71	77	100		
Rock Face Brick and Stone Siding	63	72	78			

Helps for Figuring Corrugated Sheets

Number of Corrugated Sheets in One Sq.			Number of Sq. Ft. in One Corrugated Sheet		
Length of Sheet Feet	2, 2½, and 3 inch Corrugations (width 26 inches)	1¼ inch Corrugations (width 25 inches)	Length of Sheet Feet	2, 2½ and 3 inch Corrugations (width 26 inches)	1¼ inch Corrugations (width 25 inches)
5	9.23	9.60	5	10.83	10.42
6	7.69	8.00	6	13.00	12.50
7	6.59	6.86	7	15.17	14.58
8	5.77	6.00	8	17.33	16.67
9	5.13	5.33	9	19.50	18.75
10	4.62	4.80	10	21.67	20.83
11	4.19	4.37	11	23.83	22.88
12	3.85	4.00	12	26.00	25.00

Full width of Corrugated Sheets is charged for. No allowance is made for laps in these tables.

For residences, churches, garages and other buildings where artistic roofing is desired Toncan Metal Spanish Tile and Shingles should be used. See description on pages 84, 85, 86 and 87.

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Weights of Roofing Materials

Table showing approximate weights in a square foot of various materials used for roofing.

MATERIAL	Average Weight Pounds to a Square Foot
Asphalt on slabs	20
Corrugated Galvanized Toncan Metal Sheets, No. 20 unboarded	2¼
Copper, 16 oz. standing seam	1¼
Felt and asphalt, without sheathing	2
Glass, ¼ inch thick	1¾
Hemlock sheathing, 1 inch thick	2
Lead, about ⅛ inch thick	6 to 8
Lath and plaster ceiling (ordinary)	6 to 8
Paper, tarred	6
Spruce sheathing, 1 inch thick	2½
Slate, ⅜ inch thick, double lap	6¾
Slate, ⅛ inch thick, 3-inch double lap	4½
Slate, on iron	10
Shingles, 6 x 18—one-third to weather	2
Skylight of glass, ⅜ to ½ inch, including frame	4 to 10
Slag roof, 4-ply	4
Terne plate, 1C., without sheathing	½
Terne plate, 1X., without sheathing	⅝
Tiles (plain) 10½ x 6¼—5¼ inches to weather	18
Tiles (Spanish) 14½ x 10½—7¼ inches to weather	8½
White pine sheathing, 1 inch thick	2½
Yellow pine sheathing, 1 inch thick	4
Zinc, sheet	8

Snow and Wind Loads

Data in regard to snow and wind loads is necessary in connection with the design of roof trusses.

Snow Load. When the slope of a roof is over 12 inches rise in a foot of horizontal run, a snow and accidental load of 8 pounds to a foot is ample. When the slope is under 12 inches rise to a foot of run, a snow and accidental load of 12 pounds to a square foot should be used. The snow load acts vertically, and should therefore be added to the dead load in designing roof trusses. The snow load may be neglected when a high wind pressure has been considered, as a great wind storm would very likely remove all the snow from the roof.

Wind Load. The wind is considered as blowing in a horizontal direction, but the resulting pressure upon the roof is always taken normal (at right angles) to the slope.

Table below gives the pressure exerted upon roof of different slopes, by a wind pressure of 40 pounds to a square foot on a vertical plane, which is equivalent to the intensity of a violent hurricane.

Wind Pressure on Roofs

(Pounds to a square foot)

Rise, Inches in a Foot of Run	Angle with Horizontal	Pitch Proportion Rise to Span	Wind Pressure Normal to Slope
4	18° 25′	⅛	16.8
6	26° 33′	¼	23.7
8	33° 41′	⅜	29.1
12	45° 0′	½	36.1
16	53° 7′	⅝	38.7
18	56° 20′	¾	39.3
24	63° 27′	1	40.0

This Trade Mark TONCAN METAL *Stenciled on every Sheet*

Corrugated Sheets

For Roofing, Siding, Ceiling, Doors, Shutters, Awnings, Etc.

Painted or Galvanized

Corrugated is one of the strongest known forms of sheet iron, and imparts material strength to its least rigidity in the direction in which it is attached.

Its legitimate use is for Siding and Roofing. It is the best material known for use on structures of moderate cost that are required to be fire-proof.

We do not recommend Corrugated Roofing for roofs having less than 4-inch pitch. (See "Roof Elevation" on page 17.)

2-Inch Corrugated Sheets

Width, 30 inches. Lengths, 5, 6, 7, 8, 9 and 10 ft. All gauges 16 and lighter.

2½-Inch Corrugated Sheets

Width, 28 and 30½ inches. Lengths, 5, 6, 7, 8, 9, 10, 11 and 12 ft. All gauges 16 and lighter.

2-Inch Corrugated Sheets

Width, 28 inches. Lengths, 5, 6, 7, 8, 9 and 10 ft. All gauges 16 and lighter.

1¼-Inch Corrugated Sheets

Width, 28 inches. Lengths, 5, 6, 7, 8, 9 and 10 ft. All gauges 26 and lighter.

¼-Inch Corrugated Sheets

Width, 20½ inches. Lengths, 5, 6, 7 and 8 ft. Made in 28 gauge galvanized only.

¼-inch Corrugated Sheets are used for ceilings, partitions, etc.

NOTE: The selling widths of all corrugated sheets are the widths shown above. No allowance made for lap. By lapping 2-inch wide sheets one corrugation each side, a covering width of about 24 inches per sheet is obtained. 2½-inch wide 2½-inch corrugated sheets give about 26-inch covering width by lapping one and one-half corrugations on each side. 28 gauge galvanized and 26 gauge black are lighter gauges of Toncan Metal Sheets.

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How to Estimate Toncan Metal Roofing and Siding

Fig. A—For Shed Roofs

Fig. C—For Hip Roofs

Fig. B—For Ridge Roofs

Fig. D—For Gables

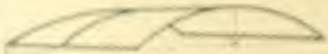


Fig. E—For Curved Sheets for Ceiling

Pick that diagram which most nearly resembles your building and measure it as indicated. Obtain the number of square feet each of Roofing and Siding required; divide by 100 to obtain squares needed. See tables of Sheets and Roofing to a square on pages 49, 50 and 51. 100 sq. ft. equal one "square" Toncan Metal.

For Corrugated Roofing and Siding

Find which the best lengths of sheets to fit the space, bearing in mind the end laps. For Toncan Metal Siding one inch end lap will do, while for Toncan Metal Roofing nothing less than three inches, and if roof is flat, make six inches, for end lap. As each sheet lays just two feet wide, it is a simple matter to ascertain the number of sheets necessary to cover the space.

See tables on pages 49, 50 and 51 for number of squares (100 sq. ft.) in sheets [illegible] Toncan Metal Corrugated Roofing and Siding.

This Trade Mark [logo] Stenciled on every Sheet

Number of Squares (100 Sq. Ft.) in Sheets of 2 and 2½-inch Toncan Metal Corrugated Siding and Roofing

Number of Sheets	4 ft.	5 ft	6 ft.	7 ft.	8 ft	9 ft	10 ft	11 ft	12 ft
1	.09	.11	.13	.15	.17	.19	.22	.24	.26
2	.18	.22	.26	.31	.35	.39	.44	.48	.52
3	.26	.33	.39	.46	.52	.59	.65	.72	.78
4	.35	.44	.52	.61	.70	.78	.87	.96	1.04
5	.44	.55	.65	.76	.87	.98	1.09	1.20	1.30
6	.52	.65	.78	.91	1.04	1.17	1.30	1.43	1.56
7	.61	.76	.91	1.06	1.22	1.37	1.52	1.67	1.82
8	.70	.87	1.04	1.22	1.39	1.56	1.74	1.91	2.08
9	.78	.98	1.17	1.37	1.56	1.76	1.95	2.15	2.34
10	.87	1.09	1.30	1.52	1.74	1.96	2.17	2.39	2.60
11	.96	1.20	1.43	1.67	1.91	2.15	2.39	2.63	2.86
12	1.04	1.30	1.56	1.82	2.08	2.34	2.60	2.86	3.12
13	1.13	1.41	1.69	1.96	2.26	2.54	2.82	3.10	3.38
14	1.22	1.52	1.82	2.13	2.43	2.73	3.04	3.34	3.64
15	1.30	1.63	1.95	2.28	2.60	2.93	3.25	3.58	3.90
16	1.39	1.74	2.08	2.43	2.78	3.13	3.47	3.81	4.16
17	1.48	1.85	2.21	2.58	2.95	3.32	3.69	4.05	4.42
18	1.56	1.95	2.34	2.73	3.12	3.51	3.90	4.29	4.68
19	1.65	2.06	2.47	2.89	3.30	3.71	4.12	4.53	4.94
20	1.74	2.17	2.60	3.04	3.47	3.90	4.34	4.77	5.20
21	1.82	2.28	2.73	3.19	3.64	4.10	4.55	5.00	5.46
22	1.91	2.39	2.86	3.34	3.82	4.29	4.77	5.25	5.72
23	2.00	2.50	2.99	3.49	3.99	4.48	4.99	5.48	5.98
24	2.08	2.60	3.12	3.64	4.16	4.68	5.20	5.72	6.24
25	2.17	2.71	3.25	3.79	4.34	4.88	5.42	5.96	6.50
26	2.26	2.82	3.38	3.95	4.51	5.07	5.64	6.19	6.76
27	2.34	2.93	3.51	4.10	4.68	5.27	5.85	6.44	7.02
28	2.43	3.04	3.64	4.25	4.86	5.46	6.08	6.68	7.28
29	2.52	3.15	3.77	4.40	5.03	5.66	6.29	6.91	7.54
30	2.60	3.25	3.90	4.55	5.20	5.85	6.50	7.15	7.80
31	2.69	3.36	4.03	4.70	5.38	6.05	6.72	7.39	8.06
32	2.78	3.47	4.16	4.86	5.55	6.24	6.94	7.63	8.32
33	2.86	3.58	4.29	5.01	5.72	6.44	7.15	7.87	8.58
34	2.95	3.69	4.42	5.16	5.90	6.63	7.37	8.10	8.84
35	3.04	3.80	4.55	5.31	6.07	6.82	7.58	8.34	9.10
36	3.12	3.90	4.68	5.46	6.24	7.02	7.80	8.58	9.36
37	3.21	4.01	4.81	5.62	6.42	7.22	8.02	8.82	9.62
38	3.30	4.12	4.94	5.77	6.59	7.41	8.24	9.06	9.88
39	3.38	4.23	5.07	5.92	6.76	7.61	8.45	9.30	10.14
40	3.47	4.34	5.20	6.07	6.94	7.80	8.67	9.53	10.40
41	3.56	4.45	5.33	6.22	7.11	8.00	8.88	9.77	10.66
42	3.64	4.53	5.46	6.37	7.28	8.19	9.10	10.01	10.92
43	3.73	4.66	5.59	6.53	7.46	8.39	9.32	10.25	11.19
44	3.82	4.77	5.72	6.68	7.63	8.58	9.54	10.49	11.44
45	3.90	4.88	5.85	6.83	7.80	8.78	9.75	10.72	11.70
46	3.99	4.99	5.98	6.98	7.98	8.97	9.97	10.95	11.96
47	4.08	5.10	6.11	7.13	8.15	9.17	10.18	11.20	12.22
48	4.16	5.20	6.24	7.28	8.32	9.36	10.40	11.44	12.48
49	4.25	5.31	6.37	7.44	8.50	9.56	10.62	11.68	12.74
50	4.34	5.42	6.50	7.59	8.67	9.75	10.84	11.92	13.00

This Trade Mark  *Stenciled on every Sheet*

Number of Squares (100 Sq. Ft.) in Sheets of 2 and 2½-Inch Toncan Metal Corrugated Siding

(Continued)

Number of sheets	4 ft.	5 ft.	6 ft.	7 ft.	8 ft.	9 ft.	10 ft.	11 ft.	12 ft.
51	4.42	5.53	6.63	7.74	8.84	9.95	11.05	12.16	13.26
52	4.51	5.64	6.76	7.89	9.02	10.14	11.27	12.40	13.52
53	4.60	5.75	6.89	8.04	9.19	10.34	11.49	12.64	13.78
54	4.68	5.85	7.02	8.19	9.36	10.53	11.70	12.87	14.04
55	4.77	5.96	7.15	8.35	9.54	10.73	11.92	13.11	14.30
56	4.86	6.07	7.28	8.50	9.71	10.92	12.14	13.35	14.56
57	4.94	6.18	7.41	8.65	9.88	11.12	12.35	13.59	14.82
58	5.03	6.29	7.54	8.80	10.06	11.31	12.57	13.83	15.08
59	5.12	6.40	7.67	8.95	10.23	11.51	12.79	14.06	15.34
60	5.20	6.50	7.80	9.10	10.40	11.70	13.00	14.30	15.60
61	5.29	6.61	7.93	9.26	10.58	11.90	13.22	14.54	15.86
62	5.38	6.72	8.06	9.41	10.75	12.09	13.44	14.78	16.12
63	5.46	6.83	8.19	9.56	10.92	12.29	13.65	15.02	16.38
64	5.55	6.94	8.32	9.71	11.10	12.48	13.87	15.25	16.64
65	5.64	7.05	8.45	9.86	11.27	12.68	14.09	15.49	16.90
66	5.72	7.15	8.58	10.01	11.44	12.87	14.30	15.73	17.16
67	5.81	7.26	8.71	10.17	11.62	13.07	14.52	15.97	17.42
68	5.90	7.37	8.84	10.32	11.79	13.26	14.74	16.21	17.68
69	5.98	7.48	8.97	10.47	11.96	13.46	14.95	16.45	17.94
70	6.07	7.59	9.10	10.62	12.14	13.65	15.17	16.68	18.20
71	6.16	7.70	9.23	10.77	12.31	13.85	15.39	16.92	18.46
72	6.24	7.80	9.36	10.92	12.48	14.04	15.60	17.16	18.72
73	6.33	7.91	9.49	11.08	12.66	14.24	15.82	17.40	18.98
74	6.42	8.02	9.62	11.23	12.83	14.43	16.04	17.64	19.24
75	6.50	8.13	9.75	11.38	13.00	14.63	16.25	17.88	19.50
76	6.59	8.24	9.88	11.53	13.18	14.82	16.47	18.12	19.76
77	6.68	8.35	10.01	11.68	13.35	15.02	16.69	18.36	20.02
78	6.76	8.45	10.14	11.83	13.52	15.21	16.90	18.59	20.28
79	6.85	8.56	10.27	11.99	13.70	15.41	17.12	18.83	20.54
80	6.94	8.67	10.40	12.14	13.87	15.60	17.34	19.07	20.80
81	7.02	8.78	10.53	12.29	14.04	15.80	17.55	19.31	21.06
82	7.11	8.89	10.66	12.44	14.22	15.99	17.77	19.55	21.32
83	7.20	9.00	10.79	12.59	14.39	16.19	17.99	19.79	21.58
84	7.28	9.10	10.92	12.74	14.56	16.38	18.20	20.02	21.84
85	7.37	9.21	11.05	12.90	14.74	16.58	18.42	20.26	22.10
86	7.46	9.32	11.18	13.05	14.91	16.77	18.64	20.50	22.36
87	7.54	9.43	11.31	13.20	15.08	16.97	18.85	20.74	22.62
88	7.63	9.54	11.44	13.35	15.26	17.16	19.07	20.98	22.88
89	7.72	9.65	11.57	13.50	15.43	17.36	19.29	21.22	23.14
90	7.80	9.75	11.70	13.65	15.60	17.55	19.50	21.45	23.40
91	7.89	9.86	11.83	13.81	15.78	17.75	19.72	21.69	23.66
92	7.98	9.97	11.96	13.96	15.95	17.94	19.94	21.93	23.92
93	8.06	10.08	12.09	14.11	16.12	18.14	20.15	22.17	24.18
94	8.15	10.19	12.22	14.26	16.30	18.33	20.37	22.41	24.44
95	8.24	10.30	12.35	14.41	16.47	18.53	20.59	22.65	24.70
96	8.32	10.40	12.48	14.56	16.64	18.72	20.80	22.88	24.96
97	8.41	10.51	12.61	14.72	16.82	18.92	21.02	23.12	25.22
98	8.50	10.62	12.74	14.87	16.99	19.11	21.24	23.36	25.48
99	8.58	10.73	12.87	15.02	17.16	19.31	21.45	23.60	25.74
100	8.67	10.84	13.00	15.17	17.34	19.50	21.67	23.84	26.00

This Trade Mark TONCAN METAL *Stenciled on every Sheet*

Number of Squares (100 Sq. Ft.) in Sheets of 2 and 2½-Inch Toncan Metal Corrugated Siding

(Concluded)

Number of sheets	4 ft.	5 ft.	6 ft.	7 ft.	8 ft.	9 ft.	10 ft.	11 ft.	12 ft.
101	8.76	10.95	13.13	15.32	17.51	19.70	21.89	24.08	26.26
102	8.84	11.05	13.26	15.47	17.68	19.89	22.10	24.31	26.52
103	8.93	11.16	13.39	15.63	17.86	20.09	22.32	24.55	26.78
104	9.02	11.27	13.52	15.78	18.03	20.28	22.54	24.79	27.04
105	9.10	11.38	13.65	15.93	18.20	20.48	22.75	25.03	27.30
106	9.19	11.49	13.78	16.08	18.38	20.67	22.97	25.27	27.56
107	9.28	11.60	13.91	16.23	18.55	20.87	23.19	25.51	27.82
108	9.36	11.70	14.04	16.38	18.72	21.06	23.40	25.74	28.08
109	9.45	11.81	14.17	16.54	18.90	21.26	23.62	25.98	28.34
110	9.54	11.92	14.30	16.69	19.07	21.45	23.84	26.22	28.60
111	9.62	12.03	14.43	16.84	19.24	21.65	24.05	26.46	28.86
112	9.71	12.14	14.56	16.99	19.42	21.84	24.27	26.70	29.12
113	9.80	12.25	14.69	17.14	19.59	22.04	24.49	26.94	29.38
114	9.88	12.35	14.82	17.29	19.76	22.23	24.70	27.17	29.64
115	9.97	12.46	14.95	17.45	19.94	22.43	24.92	27.41	29.90
116	10.06	12.57	15.08	17.60	20.11	22.62	25.14	27.65	30.16
117	10.14	12.68	15.21	17.75	20.28	22.82	25.35	27.89	30.42
118	10.23	12.79	15.34	17.90	20.46	23.01	25.57	28.13	30.68
119	10.32	12.90	15.47	18.05	20.63	23.21	25.79	28.37	30.94
120	10.40	13.00	15.60	18.20	20.80	23.40	26.00	28.60	31.20
121	10.49	13.11	15.73	18.36	20.98	23.60	26.22	28.84	31.46
122	10.58	13.22	15.86	18.51	21.15	23.79	26.44	29.08	31.72
123	10.66	13.33	15.09	18.66	21.32	23.99	26.65	29.32	31.98
124	10.75	13.44	16.12	18.81	21.49	24.18	26.87	29.56	32.24
125	10.84	13.55	16.25	18.96	21.67	24.38	27.09	29.80	32.50
126	10.92	13.65	16.38	19.11	21.84	24.57	27.30	30.03	32.76
127	11.01	13.76	16.51	19.27	22.02	24.77	27.52	30.27	33.02
128	11.10	13.87	16.64	19.42	22.19	24.96	27.74	30.51	33.28
129	11.18	13.98	16.77	19.57	22.36	25.16	27.95	30.75	33.54
130	11.27	14.09	16.90	19.72	22.54	25.35	28.17	30.99	33.80
131	11.36	14.20	17.03	19.87	22.71	25.55	28.39	31.23	34.06
132	11.44	14.30	17.16	20.02	22.88	25.74	28.60	31.46	34.32
133	11.53	14.41	17.29	20.18	23.06	25.94	28.82	31.70	34.58
134	11.62	14.52	17.42	20.33	23.23	26.13	29.04	31.94	34.84
135	11.70	14.63	17.55	20.48	23.40	26.33	29.25	32.18	35.10
136	11.79	14.74	17.68	20.63	23.58	26.52	29.47	32.42	35.36
137	11.88	14.85	17.81	20.78	23.75	26.72	29.69	32.66	35.62
138	11.96	14.95	17.94	20.93	23.92	26.91	29.90	32.89	35.88
139	12.05	15.06	18.07	21.09	24.10	27.11	30.12	33.13	36.14
140	12.14	15.17	18.20	21.24	24.27	27.30	30.34	33.37	36.40
141	12.22	15.28	18.33	21.39	24.44	27.50	30.55	33.61	36.66
142	12.31	15.39	18.46	21.54	24.62	27.69	30.77	33.85	36.92
143	12.40	15.50	18.59	21.69	24.79	27.89	30.99	34.09	37.18
144	12.48	15.60	18.72	21.84	24.96	28.08	31.20	34.32	37.44
145	12.57	15.71	18.85	22.00	25.14	28.28	31.42	34.56	37.70
146	12.66	15.82	18.98	22.15	25.31	28.47	31.64	34.80	37.96
147	12.74	15.93	19.11	22.30	25.48	28.67	31.85	35.04	38.22
148	12.83	16.04	19.24	22.45	25.66	28.86	32.07	35.28	38.48
149	12.92	16.15	19.37	22.60	25.83	29.06	32.29	35.52	38.74
150	13.00	16.25	19.50	22.75	26.00	29.25	32.50	35.75	39.00

This Trade Mark TONCAN METAL *Stenciled on every Sheet*

General Information

With the exception of galvanized material all Toncan Metal Roofing and Siding, is painted on both sides unless ordered otherwise.

Corrugated Toncan Metal is sold by the square or pound, whichever is preferred, but all other Toncan Metal Roofing and Siding are sold by the 100 square feet.

100 square feet comprise a "square," and in the various products this is estimated according to the following measurement rules:

Corrugated Toncan Metal, Sheets, Imitation Stone and **Imitation Brick** the full width and length of sheets after being formed.

Toncan Metal V-Crimped Roofing, Beaded and **Weatherboard Siding** full length and actual covering width.

Toncan Metal Pressed Standing Seam Roofing actual covering width and full length, whether connected by end locks and shipped in rolls or separate and shipped in crates.

Toncan Metal Gutter and Valley full girth and length.

Toncan Metal Ridge Roll, Ridge Cap, Corner Board, Eaves Trough, Conductor Pipe, etc., are sold by the lineal foot. In measuring for Toncan Metal Eaves Trough and Conductor Pipe take actual length and allow one foot for each angle, miter or shoe.

Measuring for Charge After Completion of Work

For the Sheet Metal Man

Plain Roofs. Multiply the length (including the turn-up or turn-down at each end of gable) by the distance from eave to eave, and include both the material used in the ridge seams and the material lapped at eaves.

Roofs Having Hips, Valleys, etc. Each section should be measured thru the center horizontally, and, to obtain area, multiply by the length of the strip of metal at the center running up and down. In addition to the actual surface of the roof also measure the length of the hips and

valleys, and multiply one foot and the width to obtain the area. This extra on hip and valley is to make up for the extra labor and waste material in cutting and fitting these parts. Unless any opening such as chimneys, stacks, dormer windows, or ventilators measures more than 50 square feet, you should make no deductions. If the opening measures more than 50 feet and less than 100 square feet, deduct for half the size of the opening. If more than 100 square feet, deduct full size of opening. This rule is followed because the waste of material and additional work necessary in cutting and fitting for flashing such openings is at least equal to the value of the material cut out.

Siding. Multiply full length of each section by the height. Make no deduction for windows, doors, or other openings, unless each of these measures greater than 10 square feet. When less than 25 square feet, deduct for one-half; when more than 25 square feet, make deduction for the whole opening, unless casing to the windows, doors and other openings are to be covered with iron or steel, in which case no deduction should be made for openings. *Openings.* Make no deductions for openings, chimneys, stacks, skylight, dormer window, or ventilators, unless such openings measure more than 50 square feet; if more than 50 square feet and not more than 100 square feet, deduct half the size of the opening; if more than 100 square feet, deduct the full size of the opening. The labor to flash pipes and round stacks, whether of brick or metal, is charged extra. The reason for not deducting otherwise than as specified is, that the waste of material and extra work in cutting and fitting the material for flashing such openings is equal to or greater than the value of the materials cut out.

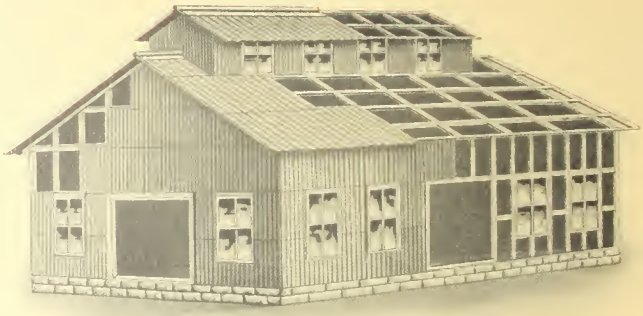
Gables are estimated by multiplying the width by one-half the height or the height by one-half the width.

Corner Strips are charged for by the lineal strip.

Cornices are charged for by the lineal foot.

Remember—It's just as important to get full gauge roofing as to get full size or count, and Toncan Metal Roofing is always full standard weight and gauge.

This Trade Mark TONCAN METAL *Stenciled on every Sheet*



Shows application of Corrugated Iron on roof and sides of skeleton frame building.

Pitch of Roof.—We would not advise the use of Corrugated Sheets on any roof of less pitch than three inches to the foot, and more is better.

Truss roofs should have pitch of one-fifth to one-fourth.

Distance Between Supports on Roof.—For Corrugated Toncan Metal Roofing, No. 26 Gauge and lighter had better be laid on close boarding, or strong lath not more than 1 foot apart.

No. 24 can be used on purlins 2 to 3 feet from centers.

Nos. 22 to 20 can be used on purlins 3 to 4 feet from centers.

No. 18 can be used on purlins 4 to 5 feet from centers.

No. 16 can be used on purlins 5 to 6 feet from centers.

Style of Toncan Metal Roofing to Use

When the pitch of roof is three inches to the foot or more, Toncan Metal Corrugated and V-Crimped Roofing or Metal Shingles may be used. If V-Crimped is desired remember that the extra V in 3 V-crimped Roofing strengthens the sheet greatly and prevents rattling.

Where the roof pitch is less than three inches to the foot, Toncan Metal Roll and Cap, or Pressed Standing Seam Roofing must be applied, as slow running water or collected snow cannot seep through the joints in these styles.

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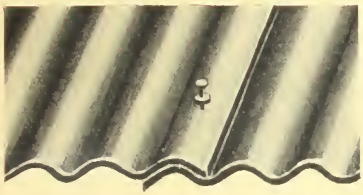
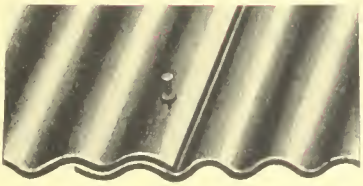
How to Apply Corrugated Toncan Metal Roofing and Siding



"A"



"B"

Corrugated Toncan Metal Sheets of the Standard 1¼, 2, 2½ and 3-inch corrugation are applied by lapping. For siding, one corrugation side lap is satisfactory. For roofing, it is essential to overcome capillary attraction. To accomplish this it is quite as satisfactory to lap one and one-half corrugations as to lap two corrugations and requires less material to cover 100 square feet of roof surface.

"A" shows one corrugation side lap which is sufficient for siding.

"B" shows one and one-half corrugations side lap as recommended for roofing. Observe that the left edge curves upward to the center of the corrugation, and the right edge curves downward to the center of the corrugation. This is accomplished by inverting alternate sheets when using for roofing the standard 26 inches wide. We can also supply Corrugated Toncan Metal Roofing Sheets 27½ inches wide, made to provide one and one-half corrugations side lap.

Corrugated Toncan Metal Sheets should have ends lapped three to six inches when applied for roofing, according to pitch of roof but for siding one to two inches is sufficient.

Be sure to provide for laps, as the amount figured according to the full width of the sheets will be shipped.

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Applying Toncan Metal Corrugated Siding

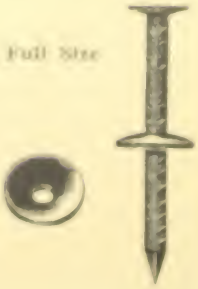
Begin at the bottom. Lap one corrugation at side of each sheet. Preserve straight lines. Lap sheets of second row over top of first row about two inches. Use a base board. When sheathing boards are not used, the siding should be nailed to studding upon 24-inch centers. Heavy gauge corrugated sheets are most always preferable. Nail according to illustration.

Fig. 1. Starting Point

This Trade Mark TONCAN *Stenciled on every Sheet*

Lead Washers

Full Size



By making a watertight joint under the nail heads, lead washers prevent all leakage at these points. One pound —325 washers are enough to put on two to three squares. ⅝-inch holes.

Applying Toncan Metal Corrugated Roofing on Wood Sheathing and Rafters

Begin laying the roofing from the end opposite to which the wind blows, i. e., if the wind blows from the left end of the building, start laying the roofing at right end. This is done so the wind will not have the opportunity to drive under the laps. Allow one corrugation of the first sheet to extend over the roof boards at edge, and allow from a two to three-inch projection of the end of the sheet over the eaves. Be careful to preserve straight lines. Hammer the projecting corrugation down over the edge of roof boards and nail it. Thru the tops of every other corrugation drive nails at the eaves. Do not nail except at sides and ends of sheets. The second sheet should be lapped over the first about one and a half corrugations, and nails driven at intervals of eight inches thru this lap. *In laying the second row* of sheets lap the lower end of sheet over the first row about three to six inches. It is a good plan to paint as the roofing is laid between laps over sheets, thus making them watertight. For light gauge corrugated roofing such as No. 26 and No. 28 there should be close sheathing. For the heavier gauges, sheathing board may be dispensed with and purlins substituted. Where the pitch on roof is less than three inches per foot, Toncan Metal Roll and Cap Roofing, or Toncan Metal Pressed Standing Seam Roofing should be used. It requires one-half pound of nails to attach a square of Corrugated Toncan Metal Roofing. It requires about one-quarter pound of lead washers for the same area, and these should be used under the nails in every instance.

Applying Corrugated Toncan Metal Roofing on Iron Framing

Fig. 1

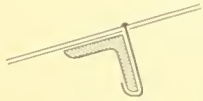


Fig. 2

Fig. 3

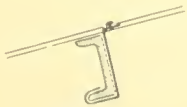


Fig. 4

Fig. 1—*Strap iron cleat riveted at each end.*

Fig. 2—*Long wire or clinch nail driven through the corrugated Toncan Metal and bent around angle iron.*

Fig. 3—*Cleat made from bar iron, riveted to roofing and binding against the flange of Z bar or angle iron.*

Fig. 4—*A strap iron cleat riveted at one end only; the other end clamping flange to channel iron.*

Illustrations show some of the best methods to follow in fastening corrugated Toncan Metal sheets to iron beams and purlins. Side laps must be riveted each 12 to 18 inches or closer; end laps every alternate corrugation. It requires about six anchors to properly fasten a sheet when it is attached to iron.

This Trade Mark TONCAN METAL *Stenciled on every Sheet*

Solders

Variety	Zinc	Copper	Silver	Tin	Lead	Bism'th	Fusing Point
Spelter, hardest	1	2					700°
Spelter, hard	2	3					
Spelter, soft	1	1					550°
Spelter, fine	2	2	¼				
Plumbers, coarse				1	3		480°
Plumbers, ordinary				1	2		440°
Plumbers, fine				2	3		400°
Tinners'				1	1		370°
For Tin Pipe				3	2		330°
For Tin Pipe				4	4	1	

Soldering Fluxes

Flux	Used With	Metals To Be Joined
Resin	Copper bit or blowpipe	Lead, tin, copper, brass, and tinned metals
Tallow, unsalted	Wiping process. Copper bit or blowpipe	Lead, tin or tinned metal
Sal Ammoniac		Copper, brass, and iron
Muriatic Acid	Copper bit or blowpipe and copper bit	Dirty zinc, clean zinc, copper, brass, tin, and tinned metals
Chloride of Zinc	Copper bit or blowpipe	Lead and tin tubes
Resin and Sweet Oil		Iron, steel, Toncan Metal, copper, and brass
Borax	Blowpipe	Brass

A Soldering Acid That Will Solder Cast Iron, Steel, Toncan Metal or Iron of Any Kind. Will Not Rust As Other Acids

In one pint of muriatic acid, dissolve all the sheet zinc it will take up, then strain off the acid and put in as much concentrated ammonia as will turn the acid white like milk; shake this well and then put in half an ounce of sal ammoniac, half dram spirits of turpentine and three drams of alcohol, shake well and keep corked while not using. This will flow better than any other for soldering.

Board and Timber Measure

In Board Measure all boards are assumed to be one inch in thickness.

To Compute Measure or Surface when all dimensions are in feet. RULE. Multiply length by breadth, and product will give surface in square feet.

To Compute Measure or Surface when either of dimensions are in inches. EXAMPLE. What are number of square feet in a board 15 feet in length and 16 inches wide. 15 x 16=240, and 240÷12=20 square feet.

To Compute Measure of Surface when all dimensions are in inches. RULE. Multiply as before and divide product by 144.

Window Glass

Thickness and Weight Per Square Foot

No.	Thickness	Weight	No.	Thickness	Weight	No.	Thickness	Weight
12	.059 in.	12 oz.	17	.083 in.	17 oz.	26	.125 in.	26 oz.
13	.063 in.	13 oz.	19	.091 in.	19 oz.	32	.154 in.	32 oz.
15	.071 in.	15 oz.	21	.1 in.	21 oz.	36	.167 in.	36 oz.
16	.077 in.	16 oz.	24	.111 in.	24 oz.	42	.2 in.	42 oz.

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Cross Corrugated Toncan Metal Sheets

(For Grain Elevators, Mills and High Buildings)

Painted or Galvanized

Manufactured especially for grain elevators, mills and high buildings where there is liability of structure settling.

Regular size elevator sheets are 10 inches long by 30 inches wide. Corrugations are 1¼", 2" and 2½".

Also furnished in 5, 6, 7, 8, 9 and 10 foot lengths and 26, 28 and 30 inch widths. Made to gauges, No. 16 and lighter.

Toncan Metal can be secured in given the short sheets or long sheets. We recommend the 28 x 82 sheets on account of their ease of erection, and their suitability for grain elevators. The long sheets are liable to buckle and cause gaps in the corner where the flashing comes while the short sheets, if applied according to the above dimensions will not do this.

How to Apply Toncan Metal Cross Corrugated Sheets

Usually a base board 6 to 12 inches wide partially covered with galv. sheets with a flange of 2 inches to go on under the corrugated sheets is used, to keep the sheets a few inches from the ground. (See figure page 56.)

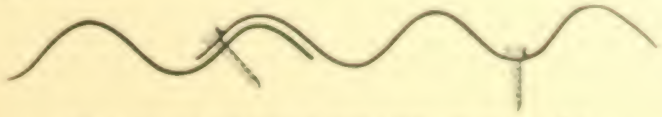

Fig. 2. How to Nail Toncan Metal Cross Corrugated Siding

Commence at bottom, running first course across side. Lap first corrugation and nail. Nail side laps every 6 inches.

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How to Apply Toncan Metal Cross Corrugated Sheets
(Continued)

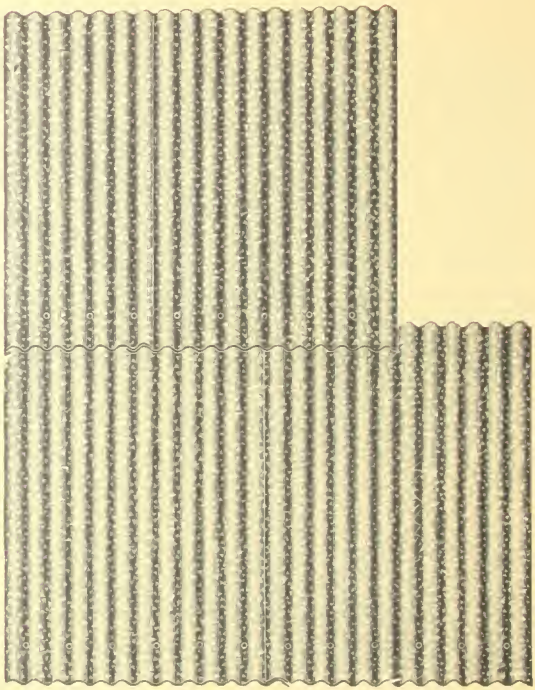

Fig. 2. Toncan Metal Cross Corrugated Sheets Applied

Proceed with second course, giving sheets 2 inches lap at end and one corrugation lap at side. In nailing the end laps, the nails should be driven 2 inches above the upper edge of lower sheets, thus allowing the sheets to slip 2 inches in every 32 inches as the sides of elevator settle and will not buckle or draw the nails. Keep the corrugations in plumb and in line.

If siding is put on studding, care should be taken to have the studding the same distance between centers as the width of iron used, and pieces of wood must be placed between studding at the end lap of sheets to nail to; or the end laps can be riveted.

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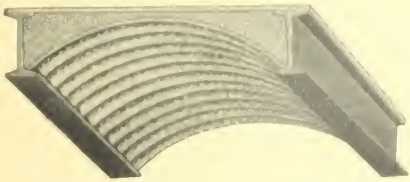
Curved Corrugated Toncan Metal Sheets

Painted or Galvanized

In all gauges 10 to 26 inclusive, curved in accordance with specifications given; any degree up to a full circle.

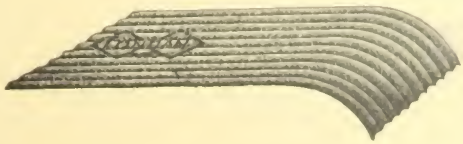


Shows application of curved corrugated sheets on floor beams for ceilings, etc., with concrete filling above sheets.

Corrugated Sheets For Awnings

Single or Double Curved

We also supply corrugated sheets, single or double curved, for awnings. As a permanent awning these are unequalled.



Single Curved Corrugated Sheet for Awnings

The above are not furnished lighter than No. 28 Gauge Galvanized; No. 26 Gauge Plain or Painted.

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Table for Computing Lengths of Toncan Metal Curved Sheets

To Ascertain Length of a Curved Sheet by Following Table:

Rule. Divide height by base, find quotient in column of heights, take length for that height opposite to it in next column on the right hand. Multiply length thus obtained by base and product will give length of sheet.

Example. To find length of sheet, base (or span) being 100 inches, rise being 25 inches.

25 divided by 100 equals .25; and .25 per table, equals 1.15912, length of base, which multiplied by 100 equals 115.912, which is length of sheet.

If for ceiling, give exact distance between sets of iron beams, rise of sheet, and length and number of sections. If for roofing, give number and length of sheets and radius required.

Height	Length	Height	Length	Height	Length	Height	Length
.001	1.00002	.123	1.03987	.166	1.07194	.209	1.11269
.005	1.0000?	.124	1.04051	.167	1.07279	.21	1.11374
.01	1.00027	.125	1.04116	.168	1.07365	.211	1.11479
.015	1.00061	.126	1.04181	.169	1.07451	.212	1.11584
.02	1.00107	.127	1.04247	.17	1.07537	.213	1.11692
.025	1.00167	.128	1.04313	.171	1.07624	.214	1.11796
.03	1.0024	.129	1.0438	.172	1.07711	.215	1.11904
.035	1.00327	.13	1.04447	.173	1.07799	.216	1.12011
.04	1.00426	.131	1.04515	.174	1.07888	.217	1.12118
.045	1.00539	.132	1.04584	.175	1.07977	.218	1.12225
.05	1.00665	.133	1.04652	.176	1.08066	.219	1.12334
.055	1.00805	.134	1.04722	.177	1.08156	.22	1.12445
.06	1.00957	.135	1.04792	.178	1.08246	.221	1.12556
.065	1.01123	.136	1.04862	.179	1.08337	.222	1.12663
.07	1.01302	.137	1.04932	.18	1.08428	.223	1.12774
.075	1.01493	.138	1.05003	.181	1.08519	.224	1.12885
.08	1.01698	.139	1.05075	.182	1.08611	.225	1.12997
.085	1.01916	.14	1.05147	.183	1.08704	.226	1.13108
.09	1.02146	.141	1.0522	.184	1.08797	.227	1.13219
.095	1.02389	.142	1.05293	.185	1.0889	.228	1.13334
.1	1.02645	.143	1.05367	.186	1.08984	.229	1.13441
.101	1.02698	.144	1.05441	.187	1.09079	.23	1.13557
.102	1.02752	.145	1.05516	.188	1.09174	.231	1.13671
.103	1.02806	.146	1.05591	.189	1.09269	.232	1.13786
.104	1.0286	.147	1.05667	.19	1.09365	.233	1.13903
.105	1.02914	.148	1.05743	.191	1.09461	.234	1.1402
.106	1.0297	.149	1.05819	.192	1.09557	.235	1.14136
.107	1.03026	.15	1.05896	.193	1.09654	.236	1.14247
.108	1.03082	.151	1.05973	.194	1.09752	.237	1.14363
.109	1.03139	.152	1.06051	.195	1.0985	.238	1.1448
.110	1.03196	.153	1.0613	.196	1.09949	.239	1.14597
.111	1.03254	.154	1.06209	.197	1.10048	.24	1.14714
.112	1.03312	.155	1.06288	.198	1.10147	.241	1.14831
.113	1.03371	.156	1.06368	.199	1.10247	.242	1.14949
.114	1.0343	.157	1.06449	.2	1.10348	.243	1.15067
.115	1.0399	.158	1.0653	.201	1.10447	.244	1.15186
.116	1.03551	.159	1.06611	.202	1.10548	.245	1.15308
.117	1.03611	.16	1.06693	.203	1.1065	.246	1.15429
.118	1.03672	.161	1.06775	.204	1.10752	.247	1.15549
.119	1.03734	.162	1.06858	.205	1.10855	.248	1.1567
.12	1.03797	.163	1.06941	.206	1.10958	.249	1.15791
.121	1.0386	.164	1.07025	.207	1.11062	.25	1.15912
.122	1.03923	.165	1.07109	.208	1.11165	.251	1.16033

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Table for Computing Lengths of Toncan Metal Curved Sheets—Continued

Height	Length	Height	Length	Height	Length	Height	Length
.252	1.16157	.315	1.24654	.378	1.34563	.441	1.45697
.253	1.16279	.316	1.24801	.379	1.34731	.442	1.45883
.254	1.16402	.317	1.24946	.38	1.34899	.443	1.46069
.255	1.16526	.318	1.25095	.381	1.35068	.444	1.46255
.256	1.16649	.319	1.25243	.382	1.35237	.445	1.46441
.257	1.16774	.32	1.25391	.383	1.35406	.446	1.46628
.258	1.16899	.321	1.25539	.384	1.35575	.447	1.46815
.259	1.17024	.322	1.25686	.385	1.35744	.448	1.47002
.26	1.1715	.323	1.25836	.386	1.35914	.449	1.47189
.261	1.17275	.324	1.25987	.387	1.36084	.45	1.47377
.262	1.17401	.325	1.26137	.388	1.36254	.451	1.47565
.263	1.17527	.326	1.26286	.389	1.36425	.452	1.47753
.264	1.17655	.327	1.26437	.39	1.36596	.453	1.47942
.265	1.17784	.328	1.26588	.391	1.36767	.454	1.48131
.266	1.17912	.329	1.2674	.392	1.36939	.455	1.4832
.267	1.1804	.33	1.26892	.393	1.37111	.456	1.48509
.268	1.18162	.331	1.27044	.394	1.37283	.457	1.48699
.269	1.18294	.332	1.27196	.395	1.37455	.458	1.48889
.27	1.18428	.333	1.27349	.396	1.37628	.459	1.49079
.271	1.18557	.334	1.27502	.397	1.37801	.46	1.49269
.272	1.18688	.335	1.27656	.398	1.37974	.461	1.4946
.273	1.18819	.336	1.2781	.399	1.38148	.462	1.49651
.274	1.18969	.337	1.27964	.4	1.38322	.463	1.49842
.275	1.19082	.338	1.28118	.401	1.38496	.464	1.50033
.276	1.19214	.339	1.28273	.402	1.38671	.465	1.50224
.277	1.19345	.34	1.28428	.403	1.38846	.466	1.50416
.278	1.19477	.341	1.28583	.404	1.39021	.467	1.50608
.279	1.1961	.342	1.28739	.405	1.39196	.468	1.508
.28	1.19743	.343	1.28895	.406	1.39372	.496	1.50992
.281	1.19887	.344	1.29052	.407	1.39548	.47	1.51182
.282	1.20011	.345	1.29209	.408	1.39724	.471	1.51378
.283	1.20146	.346	1.29366	.409	1.399	.472	1.51571
.284	1.20282	.347	1.29523	.41	1.40077	.473	1.51764
.285	1.20419	.348	1.29681	.411	1.40254	.474	1.51958
.286	1.20558	.349	1.29839	.412	1.40432	.475	1.52152
.287	1.20696	.35	1.29997	.413	1.4061	.476	1.52346
.288	1.20828	.351	1.30156	.414	1.40788	.477	1.52541
.289	1.20967	.352	1.30315	.415	1.40966	.478	1.52736
.29	1.21202	.353	1.30474	.416	1.41145	.479	1.52931
.291	1.21239	.354	1.30634	.417	1.41324	.48	1.53126
.292	1.21381	.355	1.30794	.418	1.41503	.481	1.53322
.293	1.2152	.356	1.30954	.419	1.41682	.482	1.53518
.294	1.21658	.357	1.31115	.42	1.41861	.483	1.53714
.295	1.21794	.358	1.31276	.421	1.42041	.484	1.5391
.296	1.21926	.359	1.31437	.422	1.42222	.485	1.54186
.297	1.22061	.36	1.31599	.423	1.42402	.486	1.54302
.298	1.22203	.361	1.31761	.424	1.42583	.487	1.54499
.299	1.22347	.362	1.31923	.425	1.42764	.488	1.54696
.3	1.22495	.363	1.32086	.426	1.42945	.489	1.54893
.301	1.22635	.364	1.32249	.427	1.43127	.49	1.5509
.302	1.22776	.365	1.32413	.428	1.43309	.491	1.55228
.303	1.22918	.366	1.32577	.429	1.43491	.492	1.55486
.304	1.23061	.367	1.32741	.43	1.43673	.493	1.55685
.305	1.23205	.368	1.32905	.431	1.43856	.494	1.55854
.306	1.23349	.369	1.33069	.432	1.44039	.495	1.56083
.307	1.23494	.37	1.33234	.433	1.44222	.496	1.56282
.308	1.23636	.371	1.33399	.434	1.44405	.497	1.56481
.309	1.2378	.372	1.33564	.435	1.44589	.498	1.5668
.31	1.23925	.373	1.3373	.436	1.44773	.499	1.56879
.311	1.2407	.374	1.33896	.437	1.44957	.5	1.57079
.312	1.24216	.375	1.34063	.438	1.45142		
.313	1.2436	.376	1.34229	.439	1.45327		
.314	1.24506	.377	1.34396	.44	1.45512		

This Trade Mark TONCAN METAL *Stenciled on every Sheet*

3/16-Inch Cross Crimped Toncan Metal Sheets

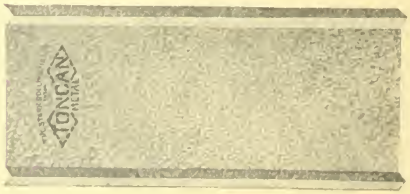
Galvanized. Gauges 24 and lighter.
Sheets of any length crimped crossways up to 36 inches wide.

This cut shows size of crimp.

This style of crimped sheets can be worked in a cornice brake and is widely used for cornice work, also used for ceilings and side walls.

V-Crimped Toncan Metal Roofing

Painted or Galvanized



2 V-Crimped Roofing

5, 6, 7, 8, 9, 10, 11 or 12 ft. long. Lays 24 in. center to center. 16 gauge and lighter.

3 V-Crimped Roofing

Lays 24 inches center to center. 5, 6, 7, 8, 9, 10, 11 or 12 feet long. Gauges: 16 and lighter. The object of the center crimp is to stiffen the sheet and prevent rattling.

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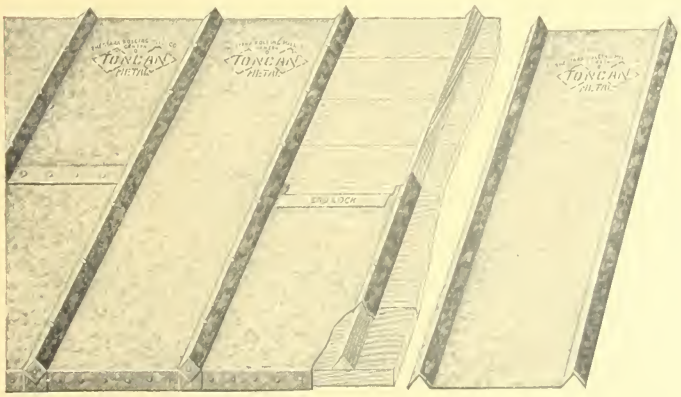
How to Apply V-Crimped Toncan Metal Roofing

A V-Shaped Wood Strip, ⅞ inch on each side, is necessary with V-Crimped Roofing. With each 100 square feet of 2 V-Crimp Toncan Metal Roofing, 50 lineal feet of V-sticks are required; with 100 square feet of 3 V-Crimp Roofing, 100 lineal feet of V-sticks are required. *V-sticks are shipped only when ordered, and take an extra over price of V-Crimp Toncan Metal Roofing.*



Start laying the V-sticks 24 inches apart (*exactly*, measured from center to center of apex). Sticks can be laid over an old shingle roof, on sheathing boards placed about two feet apart, or on rafters set on 24-inch centers. When placed on rafters, cross pieces should be nailed between the rafters wherever the sheets will lap, so as to provide a nailing support for the ends of sheets.

Begin laying the sheets from lower left-hand corner of the roof and from the eaves to the ridge. Lap two inches on ends and one crimp on sides. Nail top of sheet under the end laps every three or four inches; on crimp laps, through the V-stick every eight or ten inches. Use 1¾-inch barbed roofing nails.

Illustration above clearly indicates proper way of fastening the edges of V-Crimp Roofing to eaves. The roof can be fastened at the ridge in the same manner and complete protection effected by using roll or plain Toncan Metal Ridge Cap.

This Trade Mark TONCAN METAL *Stenciled on every Sheet*

TONCAN METAL

Pressed Standing Seam Roofing

Painted or Galvanized

5, 6, 7, 8, 9, 10 or 12-foot lengths.
Covering width, 24 inches. Gauges: 28, 27, 26, 24, 22 and 20.

How to Apply Toncan Metal Pressed Standing Seam Roofing

Snip and turn the end locks with the tongs by bending one end of the sheets up and the other down. Commence laying at the right-hand corner at the eave of the building. Flatten the right-hand cap for the first course and lay the left-hand cap to a chalk line. Let the bottom sheet project over the eave and the end of the building one inch or more, bending the projection down over and nail to the end and eave of the building; or, if there are fire walls, turn the sheet up four to six inches and securely nail ... Use two cleats on the ends and one every twelve or fourteen inches on the sides.

This Trade Mark Stenciled on every Sheet

Number of Squares in Sheets of Toncan Metal V-Crimped and Pressed Standing Seam Roofing

No. of Sheets	4 ft.	5 ft.	6 ft.	7 ft.	8 ft.	9 ft.	10 ft.	11 ft	12 ft.
2	.16	.20	.24	.28	32	.36	40	.44	.48
3	.24	.30	.36	.42	48	.54	.60	.66	.72
4	.32	.40	.48	.56	.64	.72	.80	.88	.96
5	.40	.50	.60	.70	.80	.90	1.00	1.10	1.20
6	.48	.60	.72	.84	.96	1.08	1.20	1.32	1.44
7	.56	.70	.84	.98	1.12	1.26	1.40	1.54	1.68
8	.64	.80	.96	1.12	1.28	1.44	1.60	1.76	1.92
9	.72	.90	1.08	1.26	1.44	1.62	1.80	1.98	2.16
10	.80	1.00	1.20	1.40	1.60	1.80	2.00	2.20	2.40
11	.88	1.10	1.32	1.54	1.76	1.98	2.20	2.42	2.64
12	.96	1.20	1.44	1.68	1.92	2.16	2.40	2.64	2.88
13	1.04	1.30	1.56	1.82	2.08	2.34	2.60	2.86	3.12
14	1.12	1.40	1.68	1.96	2.24	2.52	2.80	3.08	3.36
15	1.20	1.50	1.80	2.10	2.40	2.70	3.00	3.30	3.60
16	1.28	1.60	1.92	2.24	2.56	2.88	3.20	3.52	3.84
17	1.36	1.70	2.04	2.38	2.72	3.06	3.40	3.74	4.08
18	1.44	1.80	2.16	2.52	2.88	3.24	3.60	3.96	4.32
19	1.52	1.90	2.28	2.66	3.04	3.42	3.80	4.18	4.56
20	1.60	2.00	2.40	2.80	3.20	3.60	4.00	4.40	4.80
21	1.68	2.10	2.52	2.94	3.36	3.78	4.20	4.62	5.04
22	1.76	2.20	2.64	3.08	3.52	3.96	4.40	4.84	5.28
23	1.84	2.30	2.76	3.22	3.68	4.14	4.60	5.06	5.52
24	1.92	2.40	2.88	3.36	3.84	4.32	4.80	5.28	5.76
25	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.50	6.00
26	2.08	2.60	3.12	3.64	4.16	4.68	5.20	5.72	6.24
27	2.16	2.70	3.24	3.78	4.32	4.86	5.40	5.94	6.48
28	2.24	2.80	3.36	3.92	4.48	5.04	5.60	6.16	6.82
29	2.32	2.90	3.48	4.06	4.64	5.22	5.80	6.38	6.96
30	2.40	3.00	3.60	4.20	4.80	5.40	6.00	6.60	7.20
31	2.48	3.10	3.72	4.34	4.96	5.58	6.20	6.82	7.44
32	2.56	3.20	3.84	4.48	5.12	5.76	6.40	7.04	7.68
33	2.64	3.30	3.96	4.62	5.28	5.94	6.60	7.26	7.92
34	2.72	3.40	4.08	4.76	5.44	6.12	6.80	7.48	8.16
35	2.80	3.50	4.20	4.90	5.60	6.30	7.00	7.70	8.40
36	2.88	3.60	4.32	5.04	5.76	6.48	7.20	7.92	8.64
37	2.96	3.70	4.44	5.18	5.92	6.66	7.40	8.14	8.88
38	3.04	3.80	4.56	5.32	6.08	6.84	7.60	8.36	9.12
39	3.12	3.90	4.68	5.46	6.24	7.02	7.80	8.58	9.36
40	3.20	4.00	4.80	5.60	6.40	7.20	8.00	8.80	9.60
41	3.28	4.10	4.92	5.74	6.56	7.38	8.20	9.02	9.84
42	3.36	4.20	5.04	5.88	6.72	7.56	8.40	9.24	10.08
43	3.44	4.30	5.16	6.02	6.88	7.74	8.60	9.46	10.32
44	3.52	4.40	5.28	6.16	7.04	7.92	8.80	9.68	10.56
45	3.60	4.50	5.40	6.30	7.20	8.10	9.00	9.90	10.80
46	3.68	4.60	5.52	6.44	7.36	8.28	9.20	10.12	11.04
47	3.76	4.70	5.64	6.58	7.52	8.46	9.40	10.34	11.28
48	3.84	4.80	5.76	6.72	7.68	8.64	9.60	10.56	11.52
49	3.92	4.90	5.88	6.86	7.84	8.82	9.80	10.78	11.76
50	4.00	5.00	6.00	7.00	8.00	9.00	10.00	11.00	12.00

This Trade Mark TONCAN METAL *Stenciled on every Sheet*

Number of Squares in Sheets of Toncan Metal V-Crimped and Pressed Standing Seam Roofing

Continued

The Trade Mark "Toncan" Embossed on every Sheet

Number of Squares in Sheets of Toncan Metal V-Crimped and Pressed Standing Seam Roofing

(Continued)

This Trade Mark TONCAN *Guarded on every Sheet*

Number of Squares in Sheets of Toncan Metal V-Crimped and Pressed Standing Seam Roofing

(Concluded)

No. of Sheets	4 ft.	5 ft.	6 ft.	7 ft.	8 ft.	9 ft.	10 ft.	11 ft.	12 ft.
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	36.24
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[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	44.00	48.00

This Trade Mark TONCAN Stenciled on every Sheet

Roll Roofing (All Styles)

Painted or Galvanized

Covering width, 24 inches. Each roll is 50 feet long and will lay 100 square feet on the building. Each roll is perfectly straight, being made from sheets having sides and ends re-squared before sheets are galvanized.

Cross seams are double locked and notched and the End-lock is protected by a V wood strip. Each roll is 50 feet long and with a covering width of 24 inches will lay 100 square feet on the building.

Applying Toncan Metal Roll Roofing on Flat Roofs

Where the pitch or fall is less than one inch to the foot, lay the sheaths, and before putting on caps, open the seam about one quarter of an inch, and fill it with a first-class roofing cement; put on the cap and close with the squeezing tongs.

This process makes the roof secure against leakage when snow, ice or water stand upon it; but it is not necessary where the pitch is one inch or greater to the foot.

One-ply red resin sized sheathing should be laid under the metal to prevent sweating and dripping from condensation in cold weather if gas or steam is used in the building, or where there is heat next to the roof.

Roof Elevation

By the "pitch" of a roof is meant the relation which the height of the ridge above the level of the roof-plates bears to the span, or the distance between the studs on which the roof rests.

The length of rafters for the most common pitches can be found as follows from any given span:

If $\frac{1}{4}$	pitch,	multiply	span	by	.559	or	7/12	nearly.
If $\frac{1}{3}$	"	"	"	"	.6	"	3/5	"
If $\frac{3}{8}$	"	"	"	"	.625	"	5/8	"
If $\frac{1}{2}$	"	"	"	"	.71	"	7/10	"
If $\frac{5}{8}$	"	"	"	"	.8	"	4/5	"
If full	"	"	"	"	1/12	"	$1\frac{1}{8}$	"

To length thus obtained must be added amount of projections of rafters at the eaves.

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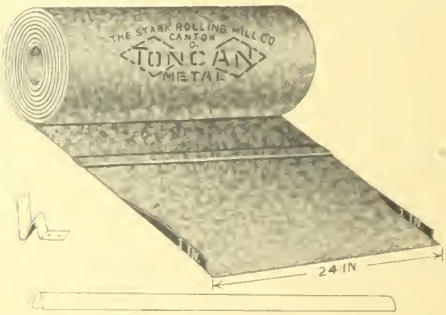
Roof Elevation (Continued)

As rafters must be purchased of even lengths, a few inches more or less on their lengths will make a difference to the pitch so slight that it cannot be detected by the eye.

EXAMPLE. To determine the length of rafters for a roof constructed one-half pitch, with a span of 24 feet—24 x .71=17.04; or practically, just 17 feet. A projection of one foot for eaves makes the length to be purchased 18 feet.

Directions for Applying Toncan Metal Roll and Cap Roofing with Protected Cleats



Commence to unroll the roofing at the top of the roof. Measure from the eaves to the comb, adding one inch for turning over at the eave, and one inch for tonging back at the comb. With the tongs turn up one inch along each side of a course. Draw a chalk line to get the first course straight, and commence laying at the right hand, if free to do so, for convenience in nailing. If against a frame building, begin there, flash or turn up the roofing six inches, and nail securely. If against a brick building, flash or turn up the roofing six inches, and nail at intervals into the joints between the bricks, then counterflash by cutting some strips of metal, wedging same into the joints of the bricks, and bending them down over the flashing. After the first course is laid to the chalk line, the cleats are nailed along the side every twelve or fifteen inches, or so as to average two cleats at each cap.

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Directions for Applying Toncan Metal Roll and Cap Roofing with Protected Cleats (Continued)

Next, bend up a new course, place the same against the first course laid, and bend the prongs of the cleats right and left to receive the caps. Beginning with the wide end of the cap at the eave, slip the cap over the cleats as they are spread right and left, the small end of one cap passing into the wide end of the preceding cap three-fourths of an inch, and continue thus to the comb. Having finished putting on a course of caps, close the seams with the squeezing tongs.

As directed, an extra inch of metal is allowed for the comb lock. Go along the comb and mallet over the standing seams, then tong the extra inch back, then cut some cleats from any waste material, hook them into the comb lock of each course and nail them to the sheathing. This done, you are ready for the

Second Side of the Roof

Begin laying the second side at the end of the building where the first side was finished. If, in proceeding, the standing seams come opposite the middle of the course of the first side, it will be easier to make the comb. For making comb, allow 1½ inches extra length to the courses. Notch the upper corners of each course 1 x ¾ inch. Bend the ¾-inch projection into the comb lock of the first side with the fingers and squeeze them together with the tongs.

Use same material for valleys. Shape the metal to the angle of the valley by forming it over a straight edge. Tong back one inch along each side of the valley; place it in position and fasten with cleats.

Into the lock of the valley hook the roofing sheets from above, mallet the joints closely and putty them well with elastic roofing cement.

Directions for Applying Toncan Metal Roll and Cap Roofing with Outside Cleats

Directions for applying Roll and Cap Roofing with Outside Cleats are the same as for Roll and Cap Roofing with Protected Cleats, except the cleating and capping, which is clearly illustrated in cut.

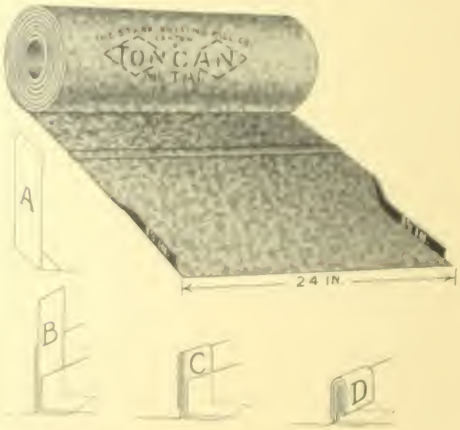
The cleat is bent down over the standing seam, the cap is then placed over the seam and cleat, then turn the cleat back over the cap and tighten the seam with squeezing tongs.

This Trade Mark TONCAN METAL *Stenciled on every Sheet*

Directions for Applying Toncan Metal Self-Capping or Plain Roll Roofing

Unroll and cut off roofing the length of roof, allowing an inch for comb on one side and two inches on the opposite side, and an inch or more for flashing or turning down at eaves. Turn the outside edge of the first strip you lay down over barge board one inch, and nail. Turn the inside edge up one inch, then anchor by using cleats nailed about 11 inches apart.

Drive nails close to edge of roofing, as it holds more firmly. Turn up edge of the next strip 1½ inches and lay it up close to the one-inch edge of the first strip; turn down over the one-inch edge, fold the end of the cleat back over the top of seam and make same tight with tongs.



The comb is made by flattening down the standing seam six to eight inches from the comb, and then turning up the ends on one side one inch and on the opposite side two inches. Anchor the one-inch side with cleats and turn the two-inch over the one-inch end. This makes a standing seam along the comb. If you use ridge roll, it is not necessary to allow the one inch and two inches on opposite sides of the comb. In this case finish the standing seams to the comb and nail the ridge roll over the comb.

Hips are made in the same way after cutting to the right angle.

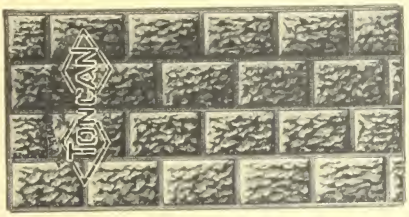
This Trade Mark "TONCAN" Stenciled on every Sheet

Siding

Painted or Galvanized

Weatherboard Siding

Covering width, 24 inches. Each sheet shows 6 boards 4 inches wide. Lengths: 5, 6, 7, 8, 9 and 10 feet. This form of siding is used very extensively on frame buildings, and can be applied directly to studding or on rough sheathing.



Imitation Rock Faced Stone Siding

Sheets, 28 x 60 inches. 1 square consists of 8 4/7 sheets.
No. 1 Size of single stone, 7 x 12 inches.
No. 2 Size of single stone, 9¾ x 20 inches.

Imitation Pressed Brick Siding

Sheets, 28 x 60 inches. Size of single bricks, 2⅝ x 8¼ inches.

Imitation Rock Faced Brick Siding

Sheets, 27½ x 60 inches. Size of single bricks, 2⅝ x 8¼ inches.

Lightest gauges: 28 galvanized and 26 black or painted.

This Trade Mark TONCAN METAL *Stenciled on every Sheet*

Applying Toncan Metal Pressed Brick, Rock Faced Brick and Stone Siding

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

Applying Toncan Metal Weatherboard Siding

[illegible]

Note

[illegible]

The Trade Mark [illegible] *Stamped on every Sheet*

ALL genuine Toncan Metal Conductor Pipe, Eaves Trough, Elbows, Shoes, Mitres and Outfalls are embossed with the Toncan Metal Trademark and maker's name.

The recognized manufacturers of these formed products die-stamp them with the uniform stamp shown above.

By die-stamping Toncan Metal Formed Products the purchaser, manufacturer and rolling mill are protected against possible substitution by unscrupulous parties.

Tags come off—a painted stencil mark is not permanent—die stamping is the only safe way.

All who have had experience with flimsy short-lived Conductor Pipe and Eaves Trough need not be told of the necessity for something better and more lasting.

Toncan Metal Conductor Pipe, Eaves Trough and accessories are durable and never lighter than 28 gauge galvanized.

The man who wants something better and believes in improvement will use Toncan Metal Corrosion-Resisting Formed Products. By so doing he economizes and avoids the annoyance and expense of frequent replacements.

Surely, the man who indicates his desire for quality by specifying Toncan Metal is entitled to protection, hence the embossed trade mark.

Eaves Trough

Galvanized

Single or Double Bead. Slip Joint or Lap Joint.

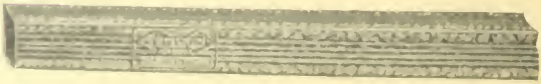
Lengths—8 and 10 feet. All sizes.

Conductor Pipe

Galvanized

Plain Round

Round Corrugated



Square Corrugated

All sizes from 2 to 6 inches can be nested in one crate.

Lengths—8 and 10 feet.

NOTE—*No Toncan Metal Sheet is made lighter than full weight No. 28 Gauge, so that all Toncan Metal Formed Products are heavy and strong.*

Look for This Stamp 

Miters and Drops

Galvanized

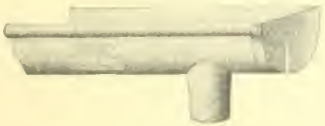
Inside or Outside Mitres

Slip or Lap Joint

Single or Double Bead

Ends, Drops and Caps

Galvanized



Made of a 12-inch piece of trough with an outlet to which the drop connection "B" is attached. The end is closed with the slip joint end cap "C," which requires no solder.

Plain Ridge Roll

Painted or Galvanized

10-Foot Lengths

Made in 8 and 10-foot lengths.
Also made with nailing flange.

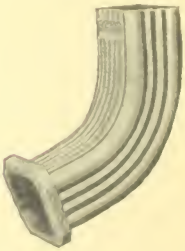
Look for This Stamp 

Conductor Pipe Elbows

Galvanized



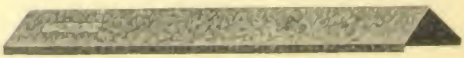
Toncan Metal Conductor Pipe Elbows are made in all the usual styles, sizes and angles to fit any style Conductor Pipe.


Write for prices on the various sizes, styles and angles of Toncan Metal Shoes.

V-Angle Ridge Cap

Painted or Galvanized

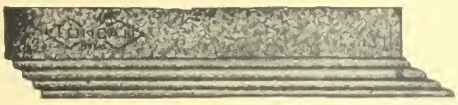


Made in 8 or 10 foot lengths—with or without nailing flange.

Look for This Stamp 

Corrugated Flashing and Corrugated Ridge Roll

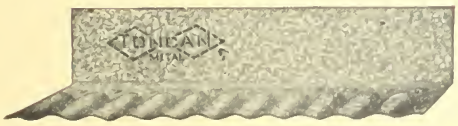
No. 977



Corrugated Side Wall Flashing

Any length up to	96 ″
Apron	8 ″
Flat side on wall	5½″

No. 978



Corrugated End Wall Flashing

Lengths	28″ and 96″
Flat side on wall	2″
Corrugated Apron	4″

No. 979

Corrugated Ridge Roll

Lengths	28″ and 96″
Diameter of roll	2″
Width of Corrugated Apron	4″

The sizes shown above are standard. Write for special sizes.

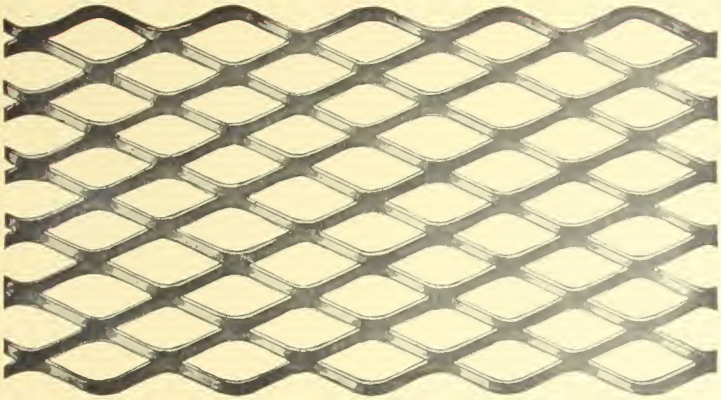
The above are not furnished lighter than No. 28 Gauge Galvanized; No. 26 Gauge Plain or painted.

This Trade Mark TONCAN METAL *Stenciled on every Piece*

Toncan Metal Skylights

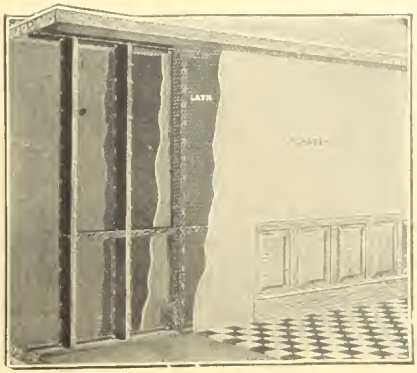
Toncan Metal Ventilators

Expanded Lath



DISCRIMINATING architects and engineers insist on expanded lath being made from Toncan Metal because of the severe corrosive influences constantly present in plaster.

For fireproof construction expanded lath is essential, and to be able to obtain this important building material made from corrosion-resisting Sheet Metal is a source of satisfaction to the specifier and user.



Showing Toncan Metal Lath Applied

Shingles

THE metal shingle meets that insistent demand for an economical sheet metal roofing suitable for residences, churches, schools, garages and other similar buildings.

"Non-durability" was the great cry that went up when the metal shingle first appeared. And undoubtedly it was warranted, because steel was used in its manufacture.

Steel is a good material but its one weakness is non-durability.

So, to eliminate this argument of "non-durability," manufacturers of metal shingles adopted the use of galvanized Toncan Metal (corrosion-Resisting Sheets).

Size 10 x 14

Showing the Toncan Metal Shingle roofed.

The Toncan Metal Shingle provides a tile roofing effect at a lower price than the clay tile and with no danger of breaking or cracking.

Summed up, the Toncan Metal Shingle is semi-neutral, durable, economical, lightning proof, fire-proof and weather-proof. It will not crack, crack, decay or melt. No heavy superstructure is required and it is easily and economically applied.

On these pages we show only one design of Toncan Metal Shingle, but there are thirteen patterns from which selection may be made.

Be sure to specify *Toncan* Metal Shingles.

Spanish Tile Roofing

"THE Aristocrat of Sheet Metal Roofing" is the fitting name applied to Toncan Metal Spanish Tile Roofing.

Toncan Metal Spanish Tile Roofing possesses all the dignity and architectural beauty found in clay tile roofing with none of the detrimental characteristics of the clay tile.

It does not crack or break, and its construction permits ample expansion and contraction.

Its weight is about two-eighths that of clay tile, thereby permitting the lightest possible roof framing and it can be used on any roof where shingles or other metal roofing can be used.

The appearance of a building can be wonderfully improved with

Hip Terminal
Height 11 Inches

Showing Toncan Metal Spanish Tile Applied

this artistic roofing. It is particularly adapted for public buildings, residences, schools, churches and garages.

Considering the fire, lightning and weather-proof properties of Toncan Metal Spanish Tile Roofing, together with its moderate price and extreme durability, it is an exceptionally efficient and economical roofing.

As Spanish Tile Roofing is also made of steel, it is important that *Toncan Metal* is distinctly specified if real durability and economy are desired.

All the accessories necessary to make a symmetrical roof, such as ridge moulding, hip moulding, gable moulding and terminals are obtainable.

Gabel Terminal
Height 9 Inches

Toncan Metal for Manufacturing Plants

Till modern manufacturing plant with smoke-stacks belching forth immense volumes of smoke, impregnates the air with injurious fumes, gases, soot and cinder.

Coming in contact with the sheet metal work on the factory building as well as the surrounding buildings, these elements play havoc.

The roofing, siding, ventilators, skylights, water tanks, eaves trough and conductor pipe are items frequently given only passing consideration. Yet, if the severe service which they must withstand is considered and the labor costs and inconvenience caused by frequent replacements are foreseen, the necessity for durable material is realized.

Toncan Metal Corrosion-Resisting Sheets will increase the life of the sheet metal work on a manufacturing plant to a degree hitherto considered impossible, and save hundreds of dollars annually for the factory owner.

An All-Toncan Metal Garage

A SHEET metal garage gives the owner a feeling of security not possible when inflammable materials are used.

A fire within the garage cannot spread while a fire outside the garage cannot destroy the costly machine within if sheet metal is used.

Usually, a garage is a permanent building—just as permanent as the owner's house.

The material that enters into its construction therefore, should be carefully selected.

Toncan Metal will increase the life of a garage wonderfully because of its corrosion-resisting properties.

Toncan Metal sheets lend themselves satisfactorily to garage construction and enhance the appearance of the building.

For instance, Toncan Metal weatherboard, rock face and brick face siding can be used for the sides and Toncan Metal Shingles or Toncan Metal Spanish Tile make an attractive roof.

Toncan Metal for Farm Buildings

THE utmost economy in farm building construction and maintenance is secured by using Toncan Metal.

The roof, the siding, the conductor pipe, eaves trough, ridge roll, leading troughs, and many other portions of the farm building can be made more durable with Toncan Metal Corrosion-Resisting Sheets.

No building is permanent, but a building can be made to last several generations, or it can be built to last only a few years.

The life of the farm building depends mainly on the material used in its construction.

In Toncan Metal there is durability and economy in every ounce. It combats rust and corrosion, is moderate in price and therefore gives the greatest service at the lowest cost.

The Toncan Metal Silo

A METAL silo is an ideal silo. It is easy to erect, to enlarge, to repair (if necessary) and to move. The sectional units of which it is composed make all these things possible.

The Metal silo is air-tight, non-porous, windproof and fireproof.

In it the ensilage is kept in prime condition, which means wholesome food when it is needed most.

And to make it durable Toncan Metal corrosion-resisting sheets must be used. Insist on it—you deserve it.

Toncan Metal Culverts

FOR strength, ease of installation and transportation, the corrugated metal culvert is recognized as superior to any other form of culvert.

Thus to enable the corrugated metal culvert to combat the severe corrosive influences constantly present, Toncan Metal is used by most of the prominent culvert manufacturers.

Durability and maximum service are secured by the use of Toncan Metal corrosion-resisting sheets.

Always look for the double diamond stencil in red on each culvert section.

Toncan Metal Intakes and Flumes Being Installed on Medina Valley Irrigation Project Near San Antonio, Texas, by the Hess Flume Co., Denver, Colo.

Another View of Medina Valley Co. Flumes Near San Antonio, Texas.

Toncan Metal Flumes Erected in N. Dakota, Washington and Montana By the Hess Flume Co. Denver, Colo.

Toncan Metal Tank, Kerrville, Texas.

Transport Ice Machine Co. Transport Ice Machine Made of Galvanized Toncan Metal Sheets.

Brick Pallets Made of Toncan Metal in use in the Riverside Fuel & Supply Co. Riverside, Ohio.

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